### 6.2.3.4.3
### *Channel Label*

The first two of the large digits indicate the current hard ID if the setting of the junction box has no parity error. If there is no entry, two dashes will be displayed. The third digit displays a dash. The fourth digit indicates the current value of the channel label; it should be 0 for the single channel version of the infusion system (i.e., XLM with DataPort).

Simultaneously press and hold the [TITRATE/QUICKSET] and [SILENCE] keys for two seconds to change the value. Use the [↑] key to increase the value and [↓] key to decrease the value.

## 6.3
# TROUBLESHOOTING PROCEDURES

*Table 6-6, PVT Troubleshooting*, describes failures that may be detected during the Performance Verification Tests (PVT). If an error code displays, see *Section 6.2, Alarm Messages and Error Codes*.

**Table 6-6. PVT Troubleshooting**

| Test Failures | Possible Causes | Corrective Actions |
|---|---|---|
| Self test<br>*Section 5.2.5* | Cassette not properly installed | Reprime and re-insert cassette |
| | Defective MCU PWA | Replace MCU PWA |
| Keypad and control knob test<br>*Section 5.2.6* | Defective display PWA or ribbon cable | Replace display PWA or ribbon cable |
| | Defective control knob | Replace control knob |
| Open door alarm test<br>*Section 5.2.7* | Cassette door open | Close cassette door |
| | Cassette not properly seated | Reseat cassette |
| | Defective sensor PWA | Replace mechanism assembly |
| | Defective mechanism assembly | Replace mechanism assembly |
| | Defective MCU PWA or ribbon cable | Replace MCU PWA or ribbon cable |
| | Defective display PWA or ribbon cable | Replace display PWA or ribbon cable |
| Alarm loudness test<br>*Section 5.2.8*<br>and<br>*Section 5.2.9* | Defective MCU PWA | Replace MCU PWA |
| | Defective power supply PWA | Replace power supply PWA |

**Table 6-6. PVT Troubleshooting**

| Test Failures | Possible Causes | Corrective Actions |
|---|---|---|
| Battery legend test *Section 5.2.10* | Defective fuse | Replace fuse |
| | Defective AC (mains) cordset | Replace AC (mains) cordset |
| | Defective display PWA or ribbon cable | Replace display PWA or ribbon cable |
| | Defective power supply PWA | Replace power supply PWA |
| Free flow test *Section 5.2.11* | Cassette not properly seated | Reseat cassette |
| | Defective cassette | Replace cassette |
| | Defective or dirty valve pins | Clean valve pins |
| | | Replace mechanism assembly |
| Distal occlusion test *Section 5.2.12* | Cassette not properly primed | Reprime cassette |
| | Defective cassette | Replace cassette |
| | Dirty sensor pin | Clean sensor pin |
| | Defective sensor PWA | Replace mechanism assembly |
| Proximal occlusion test *Section 5.2.13* | Closed proximal clamp | Open clamp |
| | Cassette not properly primed | Reprime cassette |
| | Defective cassette | Replace cassette |
| | Dirty sensor pin | Clean sensor pin |
| | Defective sensor PWA | Replace mechanism assembly |
| Delivery accuracy test *Section 5.2.14* | Set not properly primed | Reprime set |
| | Damaged or faulty set | Prime using new set |
| | Defective mechanism assembly | Replace mechanism assembly |
| Empty container/ air-in-line alarm test *Section 5.2.15* | Defective special cassette | Replace special cassette |
| | Dirty bubble sensors | Clean bubble sensors |
| | Defective bubble sensor PWA | Replace mechanism assembly |
| | Defective sensor PWA | Replace mechanism assembly |
| Electrical safety test *Section 5.2.16* | Insufficient ground connection | Attach lead to T point screw on rear of infusion system |
| | Defective AC (mains) cordset | Replace AC (mains) cordset |
| | Defective power supply PWA | Replace power supply PWA |
| Battery charger current test (optional) *Section 5.4.1* | Blown fuse | Replace fuse |
| | Defective AC (mains) cordset | Replace AC (mains) cordset |
| | Defective power supply PWA | Replace power supply PWA |

**Table 6-6. PVT Troubleshooting**

| Test Failures | Possible Causes | Corrective Actions |
|---|---|---|
| DataPort connection/ ground continuity test (optional) *Section 5.5* | Insufficient ground connection from DataPort connector to ground screw | Attach ground wire from DataPort connector to ground screw |
| | Defective DataPort/MCU cable assembly | Replace DataPort/MCU cable assembly |
| | DataPort/MCU cable not properly seated on MCU PWA | Reseat DataPort/MCU cable assembly to MCU PWA |

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Section 7

# REPLACEABLE PARTS AND REPAIR

This section itemizes all parts and subassemblies of the XL and XLM infusion systems that are repairable within the scope of this manual. In addition, this section details replacement procedures for all listed parts.

## 7.1 REPLACEABLE PARTS

Replaceable parts for the infusion system are itemized in the spare parts price list and are identified in *Figure 9-1, IPB for the Infusion System. Table 9-2, IPB for the Infusion System,* identifies each infusion system part by an index number that correlates to *Figure 9-1.* To request a copy of the current spare parts price list, contact Abbott Laboratories *(see Section 6.1, Technical Assistance).* For convenient reference, insert a copy of the spare parts price list here.

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# 7.2 REPAIR PROCEDURES

This section contains step-by-step replacement procedures for the infusion system. Prior to these procedures, safety and equipment precautions and required tools and materials are detailed. Unless otherwise stated, always perform the PVT after repair procedures.

## 7.2.1 SAFETY AND EQUIPMENT PRECAUTIONS

Before opening the front enclosure of the infusion system, take all necessary precautions for working on high-voltage equipment.

**WARNING**

**IF INDICATED, DISCONNECT INFUSION SYSTEM FROM AC (MAINS) POWER BEFORE PERFORMING A REPLACEMENT PROCEDURE.**

**WARNING**

**POSSIBLE EXPLOSION HAZARD IF INFUSION SYSTEM IS SERVICED OR REPAIRED IN THE PRESENCE OF FLAMMABLE ANESTHETICS.**

**CAUTION: Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected workstation. Store the PWA in an antistatic bag before placing it on any surface.**

## 7.2.2 REQUIRED TOOLS AND MATERIALS

The following are the tools and materials required for the replacement procedures in this section. In addition, the beginning of each procedure lists tools and materials required for that specific procedure.

- ❑ Nutdrivers, 1/4 inch, 3/16 inch, and 5/16 inch
- ❑ Small size flat-blade screwdriver
- ❑ Medium size flat-blade screwdriver
- ❑ No. 2 Phillips screwdriver
- ❑ Fuse puller
- ❑ Set of Allen wrenches
- ❑ Wide-head pliers
- ❑ Long needle-nose pliers
- ❑ X-acto® knife (with square, round, and pointed blades)
- ❑ Wood chisel, 3/8 inch
- ❑ AC (mains) power cord retainer extractor
- ❑ Mild solvent (such as isopropyl alcohol)

7.2.3

# SEPARATING THE FRONT ENCLOSURE ASSEMBLY, REAR ENCLOSURE ASSEMBLY, AND MAIN CHASSIS ASSEMBLY

The recommended tool for this procedure is a medium size flat-blade screwdriver.

**CAUTION: Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected workstation. Store the PWA in an antistatic bag before placing it on any surface.**

To separate the front enclosure assembly, rear enclosure assembly, and main chassis assembly, refer to *Figure 7-1, Front Enclosure, Main Chassis Assembly, and Rear Enclosure*, then proceed as follows:

1. Turn the control knob to OFF/CHARGE.
2. Disconnect the infusion system from AC (mains) power.
3. Remove the battery door and battery as described in *Section 7.2.5, Battery with Wire Harness Assembly and Battery Door Cover Pad Replacement.*
4. Using a medium size flat-blade screwdriver, remove the two remaining hex-head screws located on the enclosure bottom. Remove the two hex-head screws from the carrying handle.

   **Note:** Do not remove ground test-point screw.

5. Separate the front enclosure assembly from the rear enclosure assembly by carefully pulling carrying handles apart.

   **Note:** When separating the front enclosure assembly from the rear enclosure assembly, do not pull the power supply PWA from rear enclosure assembly.

   **Note:** (XLM only) When separating the front enclosure assembly from the rear enclosure assembly, slowly back off the rear enclosure assembly two to three inches and disconnect the buzzer board cable.

   **Note:** (XLM with DataPort): After removing the buzzer board, disconnect the DataPort/MCU cable assembly.

6. At the MCU PWA, disconnect the MCU/display PWA ribbon cable at J1 *(see Figure 7-3, Display PWA and MCU/Display Ribbon Cable).*
7. Separate the main chassis assembly from the front enclosure assembly.

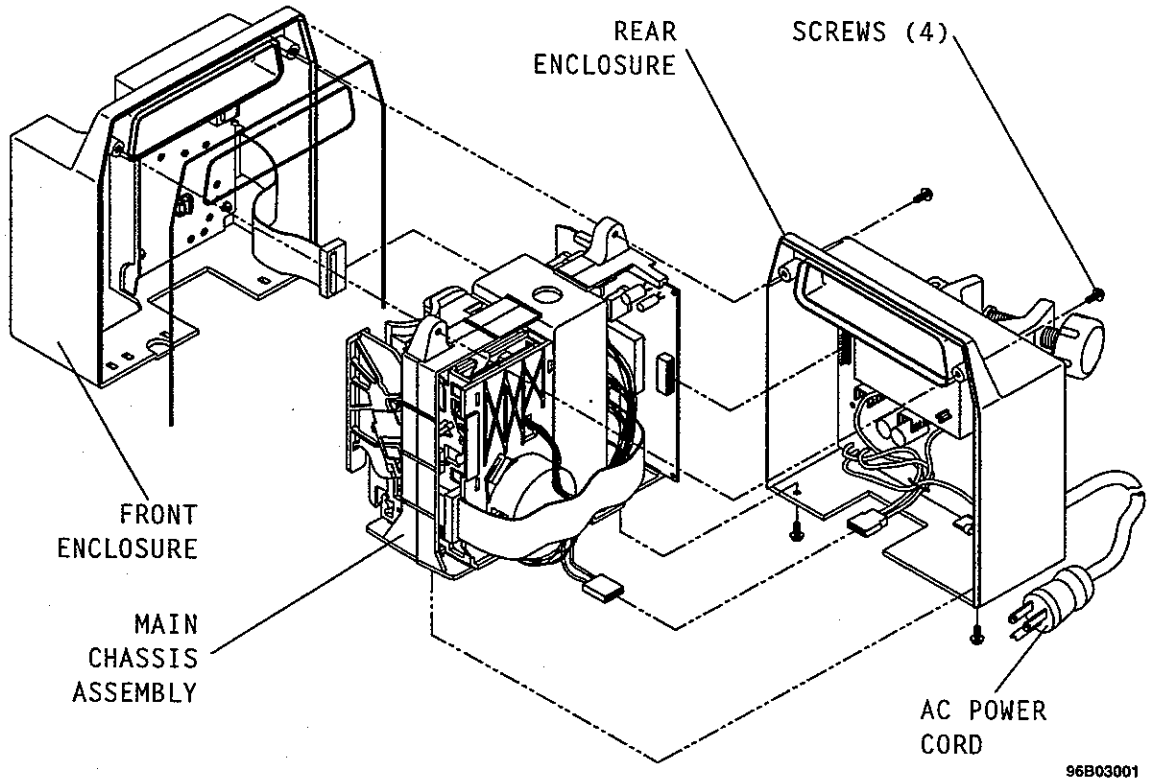


**Figure 7-1. Front Enclosure, Main Chassis Assembly, and Rear Enclosure**

## 7.2.4
# RUBBER FOOT PAD REPLACEMENT

Recommended tools for this procedure are as follows: 3/8 inch wood chisel or an X-acto knife and mild solvent.

To replace the rubber foot pads, refer to *Figure 7-2, Bottom View of Infusion System*, then proceed as follows:

1. Turn the control knob to OFF/CHARGE.
2. Disconnect the infusion system from AC (mains) power.
3. Set the infusion system on its side to access the foot pads.

   **Note:** Each adhesive-backed rubber foot pad is bonded in its recess; do not damage the recess.

4. Using a 3/8 inch wood chisel or an X-acto knife, remove the rubber foot pad and scrape the enclosure recess to remove adhesive residue.
5. Using a mild solvent, clean the enclosure recess.
6. Remove the protective backing from the self-adhesive surface and bond the replacement rubber foot pad in place.
7. After approximately five minutes, verify the foot pad is secure.
8. Connect the infusion system to AC (mains) power.

Replacement of a rubber foot pad is a routine maintenance procedure and no verification procedure is normally required. However, if the infusion system may have been damaged during a rubber foot pad replacement, perform the PVT in *Section 5.2*.

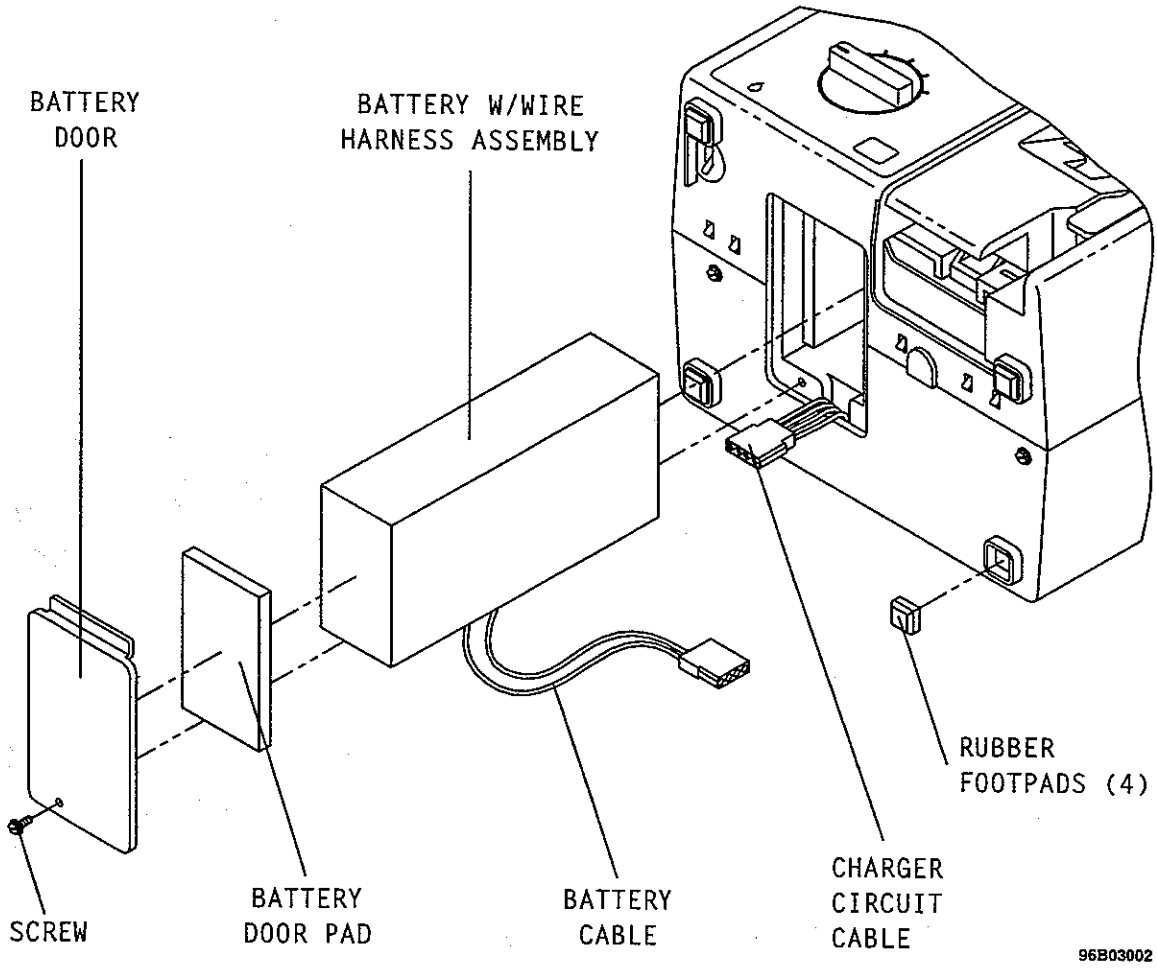


**Figure 7-2. Bottom View of Infusion System**

7.2.5

# BATTERY WITH WIRE HARNESS ASSEMBLY AND BATTERY DOOR COVER PAD REPLACEMENT

Recommended tools for this procedure are as follows: medium size flat-blade screwdriver, X-acto knife, and mild solvent.

To replace the battery with wire harness assembly and battery door, refer to *Figure 7-2, Bottom View of Infusion System*, then proceed as follows:

1. Turn the control knob to OFF/CHARGE.
2. Disconnect the infusion system from AC (mains) power.
3. Set the infusion system on its back.
4. Using a medium size flat-blade screwdriver, remove the hex-head screw securing the battery door to the infusion system. Remove the battery door.
5. Inspect the battery door cover pad for damage. If the pad is defective, use an X-acto knife and mild solvent to remove it. Dry the battery door thoroughly. Install a new battery door cover pad on the battery door.
6. Disconnect the battery cable from the charger circuit cable. Pull the battery cable wires and connector outside the enclosure. Remove the battery.

7. Connect the replacement battery cable to the charger circuit cable.

   **Note:** The cable connectors are keyed so that cables cannot be connected incorrectly.

8. Insert the replacement battery into the enclosure.
9. Confirm the battery cable is not pinched between the battery and the enclosure.
10. Replace the battery door. Using a medium size flat-blade screwdriver, replace and tighten the hex-head screw to secure the battery door to the infusion system.
11. Connect the infusion system to AC (mains) power.

To verify successful battery and battery door pad replacement, perform the PVT in *Section 5.2.*

## 7.2.6
# FRONT ENCLOSURE ASSEMBLY, REAR ENCLOSURE ASSEMBLY, OR MAIN CHASSIS ASSEMBLY REPLACEMENT

The recommended tool for this procedure is a medium size flat-blade screwdriver.

**CAUTION: Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected workstation. Store the PWA in an antistatic bag before placing it on any surface.**

To replace the front enclosure assembly, rear enclosure assembly, or main chassis assembly, refer to *Figure 7-1, Front Enclosure, Main Chassis Assembly, and Rear Enclosure,* then proceed as follows:

1. Separate the front enclosure assembly, rear enclosure assembly, and main chassis assembly as described in *Section 7.2.3, Separating the Front Enclosure Assembly, Rear Enclosure Assembly, and Main Chassis Assembly.*
2. To replace the front enclosure assembly, remove the specific components described in *Section 7.2.7, Front Enclosure Assembly Component Replacement.* To replace the rear enclosure assembly, remove the specific components described in *Section 7.2.8, Rear Enclosure Assembly Component Replacement.* To replace the main chassis assembly, remove the specific components described in *Section 7.2.9, Main Chassis Assembly Component Replacement.*
3. Remove gaskets from the front enclosure assembly.

   **Note:** Re-use gaskets if they are not worn or damaged; otherwise, replace them.

4. Replace the gaskets in the front enclosure assembly.
5. Re-assemble the replacement front enclosure assembly, rear enclosure assembly, or main chassis assembly components. Refer to the specific procedure in either *Section 7.2.7, Section 7.2.8,* or *Section 7.2.9.*

6. Join the front enclosure assembly, rear enclosure assembly, and main chassis assembly in the exact reverse order of separation.

   **Note:** (XLM with DataPort) When joining the front and rear enclosures, do not pinch the DataPort/MCU cable between the two enclosures.

7. Connect the infusion system to AC (mains) power.

To verify successful front enclosure or rear enclosure assembly replacement, perform the PVT in *Section 5.2*.

## 7.2.7
# FRONT ENCLOSURE ASSEMBLY COMPONENT REPLACEMENT

Front enclosure assembly component replacement includes the replacement of the following:

- ❑ Display PWA and MCU/display ribbon cable
- ❑ Key inserts
- ❑ Control knob, knob detent, washer, and snap retainer
- ❑ Front panel label

To replace the front enclosure assembly components, refer to either *Figure 7-3, Display PWA and MCU/Display Ribbon Cable*, or *Figure 7-4, Control Knob, Knob Detent, Washer, Gasket, Snap Retainer, and Detent Ring Placement*, then proceed as detailed in the following sections.

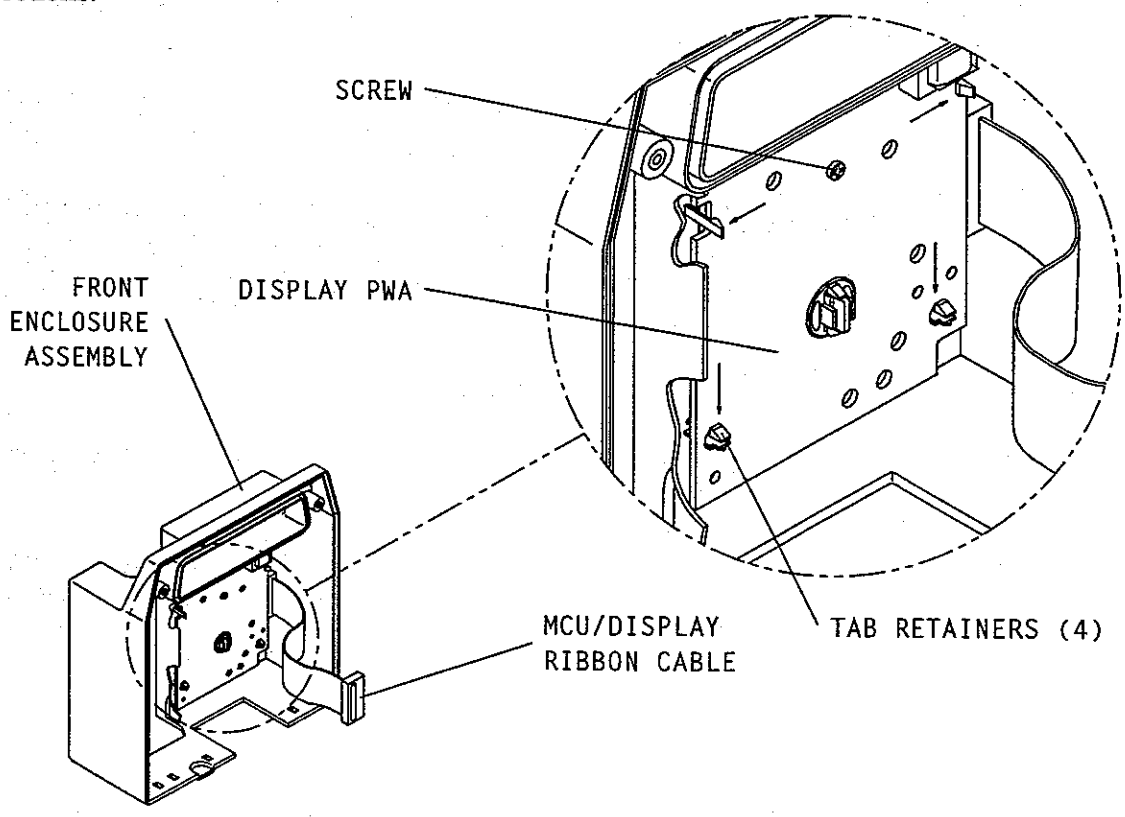


**Figure 7-3. Display PWA and MCU/Display Ribbon Cable**

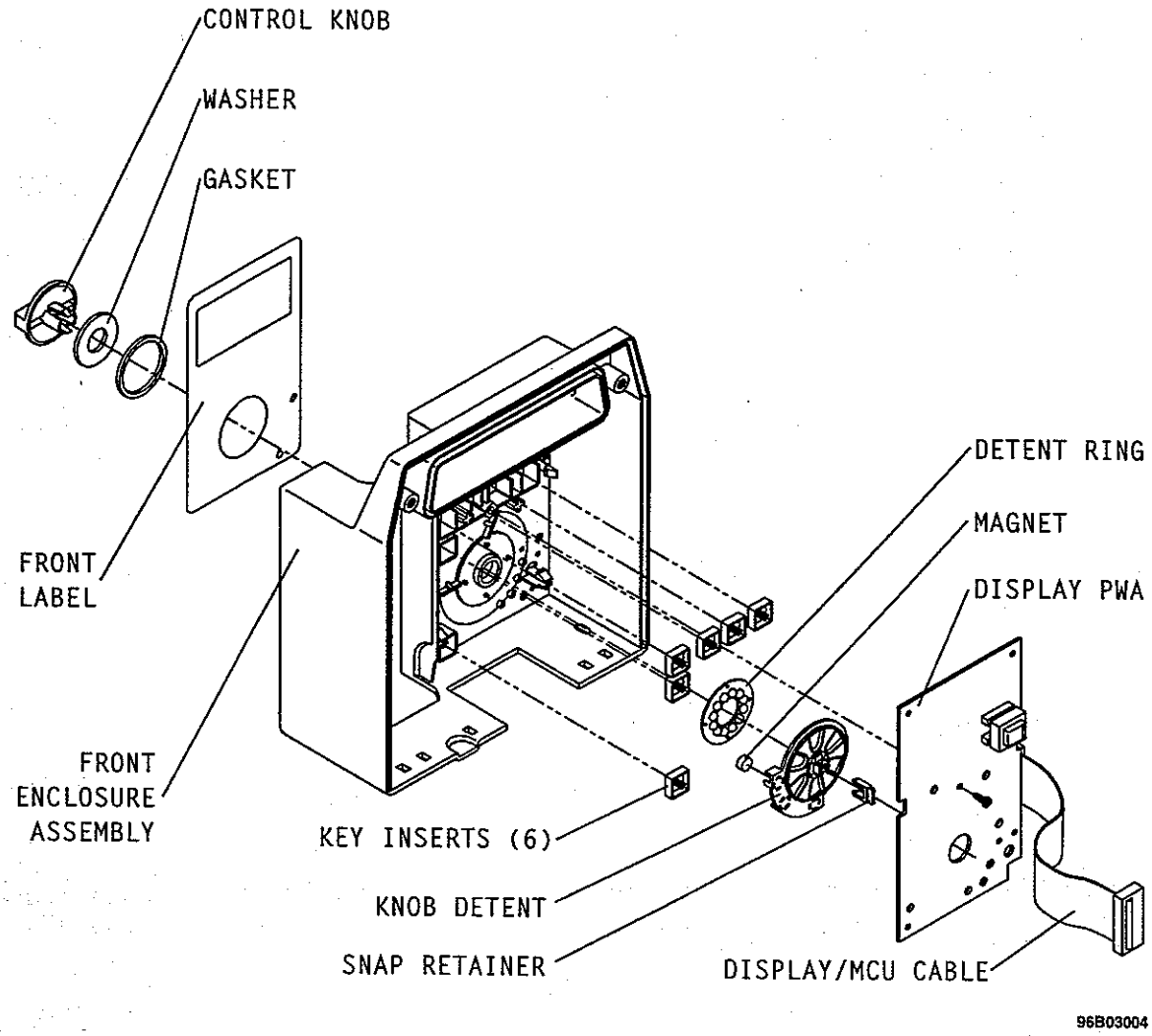


**Figure 7-4. Control Knob, Knob Detent, Washer, Gasket, Snap Retainer, and Detent Ring Placement**

7.2.7.1

## DISPLAY PWA AND MCU/DISPLAY RIBBON CABLE REPLACEMENT

Recommended tools for this procedure are as follows: medium size flat-blade screwdriver and No. 2 Phillips screwdriver.

**CAUTION: Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected workstation. Store the PWA in an antistatic bag before placing it on any surface.**

To replace the display PWA and the MCU/display ribbon cable, refer to *Figure 7-3, Display PWA and MCU/Display Ribbon Cable*, then proceed as follows:

1. Separate the front enclosure assembly and rear enclosure assembly as described in *Section 7.2.3, Separating the Front Enclosure Assembly, Rear Enclosure Assembly, and Main Chassis Assembly.*
2. Lay the front enclosure assembly face down.

3. Using a No. 2 Phillips screwdriver, remove the screw securing the display PWA to the control knob assembly.
4. Disengage the four tab retainers securing the display PWA to the front enclosure assembly. Remove the display PWA from the front enclosure assembly.
5. Disconnect the MCU/display ribbon cable from the display PWA. Replace the MCU/display ribbon cable if it is defective or damaged.
6. Install the replacement display PWA in the exact reverse order of the display PWA removal.
7. Join the front enclosure assembly and rear enclosure assembly in the exact reverse order of separation.

   **Note:** (XLM with DataPort) When joining the front and rear enclosures, do not pinch the DataPort/MCU cable between the two enclosures.

8. Connect the infusion system to AC (mains) power.

To verify successful display PWA and MCU/display ribbon cable replacement, perform the PVT in *Section 5.2*.

7.2.7.2

## KEY INSERT REPLACEMENT

Recommended tools for this procedure are as follows: medium size flat-blade screwdriver and No. 2 Phillips screwdriver.

**CAUTION: Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected workstation. Store the PWA in an antistatic bag before placing it on any surface.**

To replace the key insert, refer to *Figure 7-4, Control Knob, Knob Detent, Washer, Gasket, Snap Retainer, and Detent Ring Placement*, then proceed as follows:

1. Separate the front enclosure assembly and rear enclosure assembly as described in *Section 7.2.3, Separating the Front Enclosure Assembly, Rear Enclosure Assembly, and Main Chassis Assembly*.
2. Remove the display PWA as described in *Section 7.2.7.1, Display PWA and MCU/Display Ribbon Cable Replacement*.
3. Remove the key inserts.
4. Install replacement key inserts in the key insert recesses.
5. Replace the display PWA in the exact reverse order of removal.
6. Join the front enclosure assembly and rear enclosure assembly in the exact reverse order of separation.

   **Note:** (XLM with DataPort) When joining the front and rear enclosures, do not pinch the DataPort/MCU cable between the two enclosures.

7. Connect the infusion system to AC (mains) power.

To verify successful key insert replacement, perform the PVT in *Section 5.2*.

7.2.7.3

# CONTROL KNOB, KNOB DETENT, WASHER, GASKET, SNAP RETAINER, AND DETENT RING REPLACEMENT

Recommended tools for this procedure are as follows: medium size flat-blade screwdriver, No. 2 Phillips screwdriver, and long needle-nose pliers.

**CAUTION: Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected workstation. Store the PWA in an antistatic bag before placing it on any surface.**

To replace the control knob, knob detent, washer, and snap retainer, refer to *Figure 7-4, Control Knob, Knob Detent, Washer, Gasket, Snap Retainer, and Detent Ring Placement*, then proceed as follows:

1. Separate the front enclosure assembly and rear enclosure assembly as described in *Section 7.2.3, Separating the Front Enclosure Assembly, Rear Enclosure Assembly, and Main Chassis Assembly.*
2. Remove the display PWA as described in *Section 7.2.7.1, Display PWA and MCU/ Display Ribbon Cable Replacement.*
3. Remove the key inserts as described in *Section 7.2.7.2, Key Insert Replacement.*
4. Using long needle-nose pliers, carefully remove the snap retainer.
5. Remove the control knob, knob detent, washer, knob gasket, and detent ring.
6. Install the knob, washer, and gasket. Fit the gasket into the circular recess on the front side of the front enclosure assembly. Install the washer on the control knob. Place the control knob through the hole in the front enclosure assembly. Turn the control knob to OFF/CHARGE.

   **Note:** When the control knob is at OFF/CHARGE, the knob detent is positioned on the detent ring as shown in *Figure 7-4.*

7. Place the front enclosure assembly face down. Place the detent ring on the four pins, centered on the control knob.
8. Using the snap retainer, secure the knob detent on the control knob retainer clips and splines. Press the snap retainer firmly until it is secure.
9. Verify that the control knob rotates fully.
10. Replace the key inserts.
11. Replace the display PWA in exact reverse order of removal.
12. Join the front enclosure assembly and rear enclosure assembly in the exact reverse order of separation.

    **Note:** (XLM with DataPort) When joining the front and rear enclosures, do not pinch the DataPort/MCU cable between the two enclosures.

13. Connect the infusion system to AC (mains) power.

To verify successful control knob, knob detent, washer, and snap retainer replacement, perform the PVT in *Section 5.2.*

7.2.7.4
## FRONT PANEL LABEL REPLACEMENT

Recommended tools for this procedure are as follows: X-acto knife, long needle-nose pliers, and mild solvent.

To replace the front panel label, proceed as follows:

1. Turn the control knob to OFF/CHARGE.
2. Disconnect the infusion system from AC (mains) power.
3. Using an X-acto knife, remove the front panel label from the front panel enclosure.
4. Using a mild solvent, remove adhesive residue from the front panel assembly recess.
5. Remove the adhesive back from the replacement front panel label and press it into place on the front enclosure assembly.

Replacement of the front panel label is a routine maintenance procedure and no verification procedure is normally required. However, if the infusion system may have been damaged during the front panel label replacement, perform the PVT in *Section 5.2.*

7.2.8
## REAR ENCLOSURE ASSEMBLY COMPONENT REPLACEMENT

Rear enclosure assembly component replacement includes the replacement of the following:

- ❑ Fuses
- ❑ Power supply PWA
- ❑ AC (mains) power cord, strain relief bushing, and Velcro retainer strap
- ❑ Pole clamp extrusion, knob, backing plate, and insulator
- ❑ Pole clamp shaft/knob assembly and the pole clamp shaft tip
- ❑ Buzzer board PWA
- ❑ DataPort/MCU cable assembly

To replace the rear enclosure assembly components, refer to *Figure 7-5, Rear Enclosure Assembly Components (115 VAC - Plum XL),* or *Figure 7-6, Rear Enclosure Assembly Components (220 VAC - Plum XL),* then proceed as detailed in the following sections.

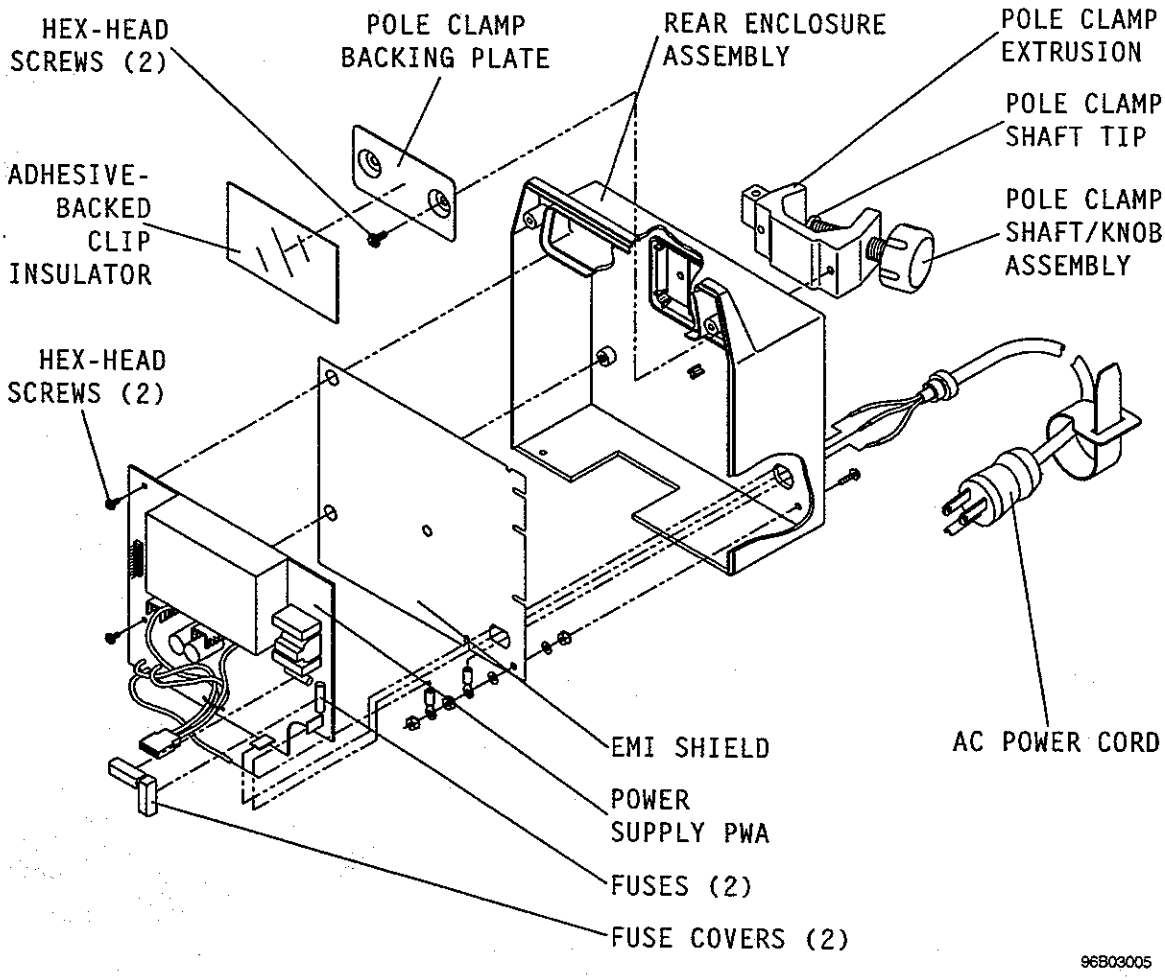


**Figure 7-5. Rear Enclosure Assembly Components (115 VAC - Plum XL)**

7.2.8.1

## FUSE REPLACEMENT

Recommended tools for this procedure are as follows: medium size flat-blade screwdriver and fuse puller.

To replace the fuse, refer to *Figure 7-5, Rear Enclosure Assembly Components (115 VAC - Plum XL)*, then proceed as follows:

1. Separate the front enclosure assembly and rear enclosure assembly as described in *Section 7.2.3, Separating the Front Enclosure Assembly, Rear Enclosure Assembly, and Main Chassis Assembly.*
2. Remove the two plastic fuse covers. Using the fuse puller, remove the two fuses on the power supply PWA.

   **CAUTION: Confirm replacement fuse rating is identical to fuse rating indicated on the power supply PWA or equipment damage may occur.**

3. Install the replacement fuses in the exact reverse order of removal.
4. Join the front enclosure assembly and rear enclosure assembly in the exact reverse order of separation.

   **Note:** (XLM with DataPort) When joining the front and rear enclosures, do not pinch the DataPort/MCU cable between the two enclosures.

5. Connect the infusion system to AC (mains) power.

To verify successful fuse replacement, perform the PVT in *Section 5.2*.

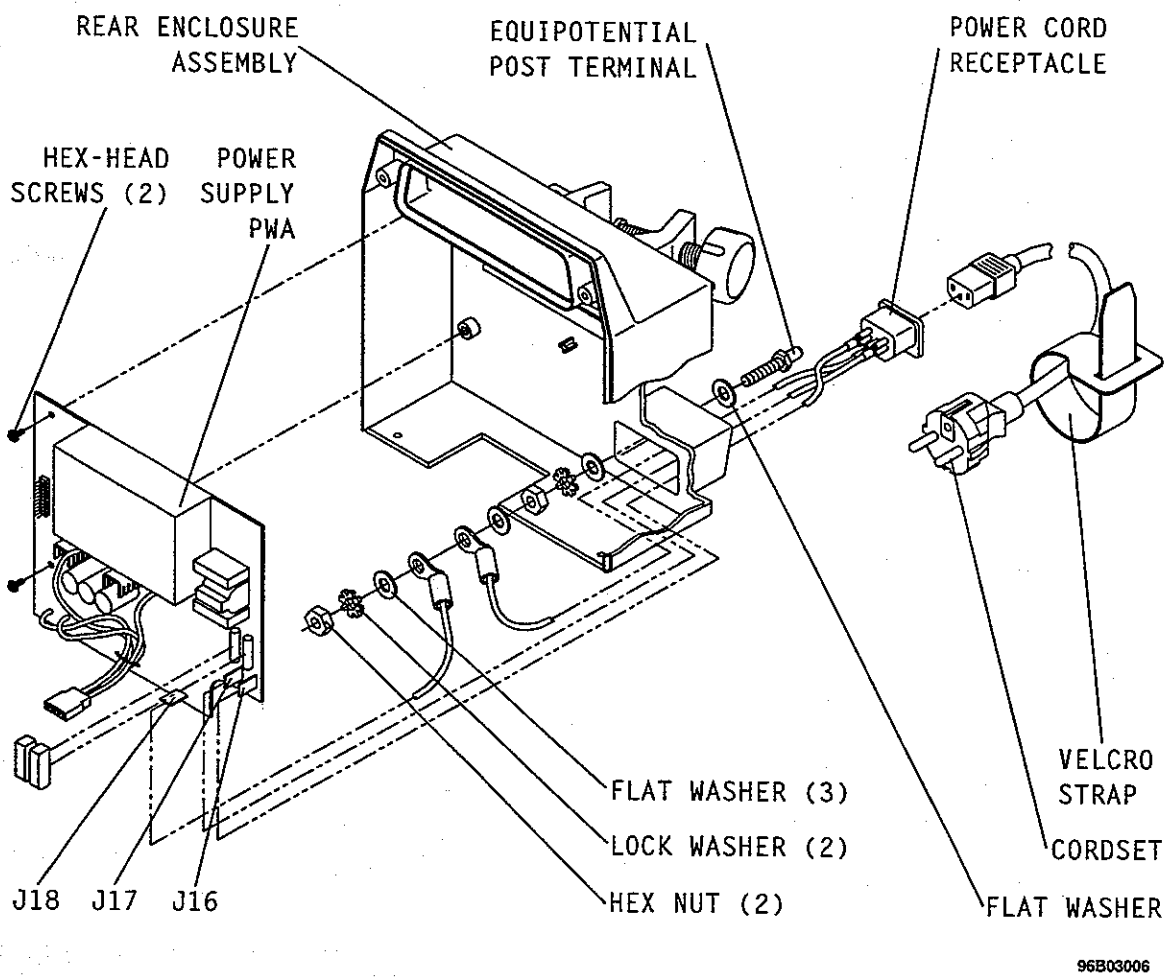


**Figure 7-6. Rear Enclosure Assembly Components (220 VAC - Plum XL)**

7.2.8.2

# POWER SUPPLY PWA REPLACEMENT

Recommended tools for this procedure are as follows: medium size flat-blade screwdriver and 1/4 inch nutdriver.

**CAUTION: Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected workstation. Store the PWA in an antistatic bag before placing it on any surface.**

To replace the power supply PWA, refer to *Figure 7-5, Rear Enclosure Assembly Components (115 VAC - Plum XL)*; *Figure 7-6, Rear Enclosure Assembly Components (220 VAC - Plum XL)*; *Figure 7-7, Rear Enclosure Assembly Components (115 VAC - Plum XLM)*; or *Figure 7-8, Rear Enclosure Assembly Components (220 VAC - Plum XLM)*, then proceed as follows:

1. Separate the front enclosure assembly and rear enclosure assembly as described in *Section 7.2.3, Separating the Front Enclosure Assembly, Rear Enclosure Assembly, and Main Chassis Assembly.*
2. Disconnect the AC (mains) power cord wire from J16 *(refer to Table 7-1, Wire Color Coding).*
3. Disconnect the AC (mains) power cord wire from J17 *(refer to Table 7-1).*
4. All infusion systems except Plum XL domestic: disconnect the AC (mains) power cord wire from J18 *(refer to Table 7-1).*
5. Using a 1/4 inch nutdriver, remove the two hex-head screws securing the power supply PWA to the rear enclosure assembly. Remove the power supply PWA from the rear enclosure assembly.
6. Install the replacement power supply PWA in the exact reverse order of removal.
7. Connect the AC (mains) power cord wire to J17 *(refer to Table 7-1).*
8. Connect the AC (mains) power cord wire to J16 *(refer to Table 7-1).*
9. All infusion systems except Plum XL domestic: connect the AC (mains) power cord wire to J18 *(refer to Table 7-1).*
10. Join the front enclosure assembly and rear enclosure assembly in the exact reverse order of separation.

    **Note:** (XLM with DataPort) When joining the front and rear enclosures, do not pinch the DataPort/MCU cable between the two enclosures.

11. Connect the infusion system to AC (mains) power.

To verify successful power supply PWA replacement, perform the PVT in *Section 5.2.*

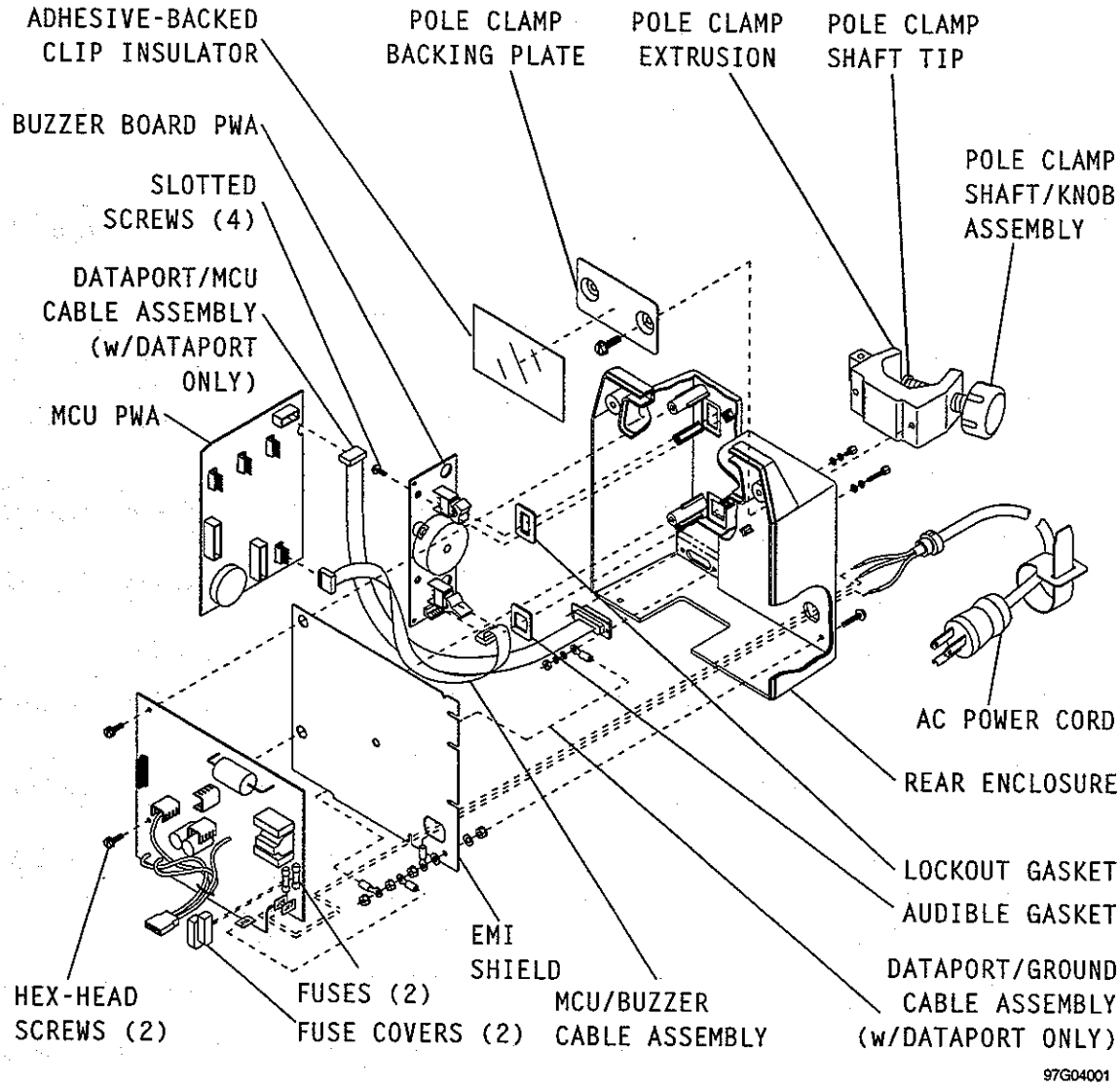


**Figure 7-7. Rear Enclosure Assembly Components (115 VAC - Plum XLM)**

**Table 7-1. Wire Color Coding**

| Voltage | Wire Color | Signal | Connects To |
|---|---|---|---|
| 115V | Black | Hot (line) | J16 |
| | White | Neutral | J17 |
| | Green | Ground | Rear panel |
| 220 V | Brown | Hot (line) | J16 |
| | Blue | Neutral | J17 |
| | Yellow/green | Earth | J18 |

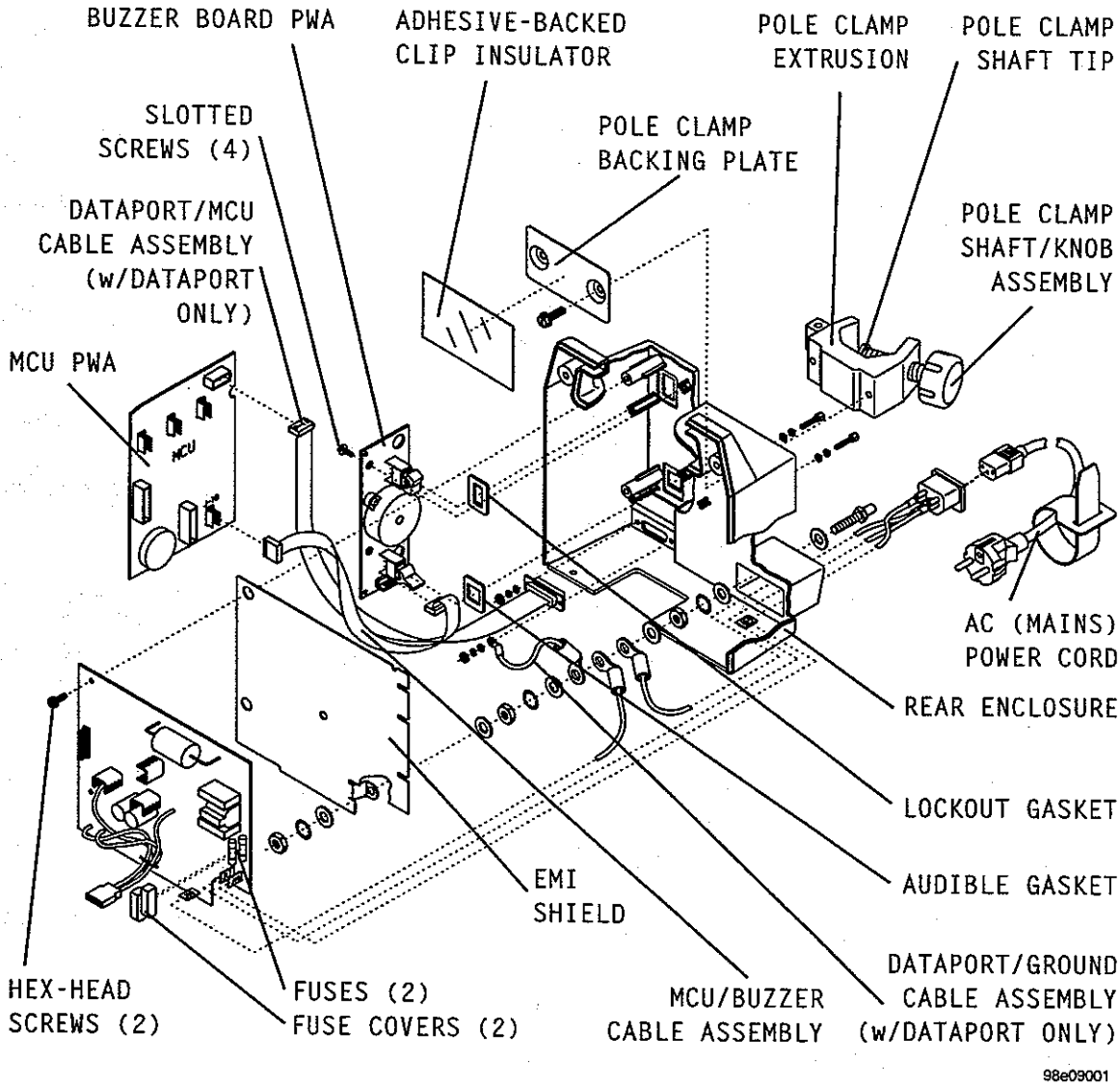


**Figure 7-8. Rear Enclosure Assembly Components (220 VAC - Plum XLM)**

7.2.8.3

## AC (MAINS) POWER CORD, STRAIN RELIEF BUSHING, AND VELCRO RETAINER STRAP REPLACEMENT

115V

Recommended tools for this procedure are as follows: medium size flat-blade screwdriver, 1/4 inch nutdriver, and AC (mains) power cord retainer extractor.

**CAUTION: Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected workstation. Store the PWA in an antistatic bag before placing it on any surface.**

To replace the AC (mains) power cord, strain relief bushing, and Velcro strap, refer to *Figure 7-5, Rear Enclosure Assembly Components (115 VAC - Plum XL)* or *Figure 7-6, Rear Enclosure Assembly Components (220 VAC - Plum XL)*, then proceed as follows:

1. Separate the front enclosure assembly and rear enclosure assembly as described in *Section 7.2.3, Separating the Front Enclosure Assembly, Rear Enclosure Assembly, and Main Chassis Assembly.*
2. Using a 1/4 inch nutdriver, remove the two hex-head nuts from the ground screw. Disconnect the green ground wire with the grounding lug from the ground screw.
3. Disconnect the AC (mains) power cord wire from J16 *(refer to Table 7-1, Wire Color Coding).*
4. Disconnect the AC (mains) power cord wire from J17 *(refer to Table 7-1).*
5. Use an AC (mains) power cord retainer extractor to remove the strain relief bushing.
6. Pull the AC (mains) power cord through the mounting hole in the rear enclosure assembly.
7. Remove the Velcro strap from the AC (mains) power cord. Slide the replacement Velcro strap over the replacement AC (mains) power cord.
8. Install the replacement AC (mains) power cord in the exact reverse order of removal.
9. Connect the AC (mains) power cord wire to J17 *(refer to Table 7-1).*
10. Connect the AC (mains) power cord wire to J16 *(refer to Table 7-1).*
11. Connect the ground wire with the grounding lug to the ground screw. Using a 1/4 inch nutdriver, replace and tighten the two hex-head nuts to the ground screw.
12. Join the front enclosure assembly and rear enclosure assembly in the exact reverse order of separation.

    **Note:** (XLM with DataPort) When joining the front and rear enclosures, do not pinch the DataPort/MCU cable between the two enclosures.

13. Connect the infusion system to AC (mains) power.

To verify successful AC (mains) power cord, strain relief bushing, and Velcro strap replacement, perform the PVT in *Section 5.2.*

7.2.8.4

## AC (MAINS) POWER CORD REPLACEMENT

No tools are required for this procedure.

To replace the AC (mains) power cord, disconnect the power cord from the rear of the infusion system and connect the new power cord.

Replacement of the AC (mains) power cord is a routine maintenance procedure and no verification procedure is normally required. However, if the infusion system may have been damaged during the power cord replacement, perform the PVT in *Section 5.2.*

7.2.8.5

# DATAPORT/MCU CABLE ASSEMBLY REPLACEMENT (XLM WITH DATAPORT)

Recommended tools for this procedure are as follows: medium size flat-blade screwdriver, 1/4 inch nutdriver, and 3/16 inch nutdriver.

**CAUTION: Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected workstation. Store the PWA in an antistatic bag before placing it on any surface.**

To replace the DataPort/MCU cable assembly, refer to *Figure 7-7, Rear Enclosure Assembly Components (115 VAC - Plum XLM)* or *Figure 7-8, Rear Enclosure Assembly Components (220 VAC - Plum XLM)*, and proceed as follows:

1. Separate the front enclosure assembly and rear enclosure assembly as described in *Section 7.2.3, Separating the Front Enclosure Assembly, Rear Enclosure Assembly, and Main Chassis Assembly.*
2. Remove the power supply PWA as described in *Section 7.2.8.2, Power Supply PWA Replacement.*
3. Remove the EMI shield.
4. Using a 3/16 inch nutdriver, remove the DataPort ground wire nut from inside the rear case.
5. Remove the two post screws on the outside of the rear case, disconnecting the DataPort ground wire.
6. Remove the DataPort/MCU cable assembly through the rear case.
7. Install the replacement DataPort/MCU cable assembly in the exact reverse order of removal.
8. Replace the EMI shield.
9. Replace the power supply PWA in the exact reverse order of removal.
10. Join the front enclosure assembly and rear enclosure assembly in the exact reverse order of separation.

    **Note:** (XLM with DataPort) When joining the front and rear enclosures, do not pinch the DataPort/MCU cable between the two enclosures.

11. Connect the infusion system to AC (mains) power.

To verify proper DataPort/MCU cable assembly replacement, perform the PVT in *Section 5.2* and the DataPort connection and ground continuity test in *Section 5.5*.

7.2.8.6

# POLE CLAMP EXTRUSION, POLE CLAMP BACKING PLATE, AND ADHESIVE-BACKED CLIP INSULATOR REPLACEMENT

Recommended tools for this procedure are as follows: medium size flat-blade screwdriver, 5/16 inch nutdriver, and mild solvent.

**CAUTION: Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected workstation. Store the PWA in an antistatic bag before placing it on any surface.**

To replace the pole clamp extrusion, pole clamp backing plate, and adhesive-backed clip insulator, refer to *Figure 7-5, Rear Enclosure Assembly Components (115 VAC - Plum XL)*, then proceed as follows:

1. Separate the front enclosure assembly and rear enclosure assembly as described in *Section 7.2.3, Separating the Front Enclosure Assembly, Rear Enclosure Assembly, and Main Chassis Assembly.*
2. Remove the power supply PWA as described in *Section 7.2.8.2, Power Supply PWA Replacement.*
3. Grasp the adhesive-backed clip insulator and remove it from the pole clamp backing plate. Using a mild solvent, clean the pole clamp backing plate.
4. Using a 5/16 inch nutdriver, remove the two hex-head screws securing the pole clamp backing plate to the pole clamp extrusion. Remove the pole clamp backing plate and pole clamp extrusion from the rear enclosure assembly.
5. Install the replacement pole clamp extrusion into the rear enclosure assembly.
6. Install the replacement pole clamp backing plate against the pole clamp extrusion. Using a 5/16 inch nutdriver, replace and tighten the two hex-head screws.
7. Remove the adhesive backing from the replacement clip insulator. Completely cover the pole clamp backing plate with the replacement clip insulator. Press firmly to adhere the clip insulator to the backing plate.

   **CAUTION: Make sure the clip insulator covers the entire backing plate. If the backing plate is exposed, the power supply PWA may be damaged when power is applied to the infusion system.**

8. Replace the power supply PWA in the exact reverse order of removal.
9. Join the front enclosure assembly and rear enclosure assembly in the exact reverse order of separation.

   **Note:** (XLM with DataPort) When joining the front and rear enclosures, do not pinch the DataPort/MCU cable between the two enclosures.

10. Connect the infusion system to AC (mains) power.

To verify successful pole clamp extrusion, backing plate, and insulator replacement, perform the PVT in *Section 5.2.*

7.2.8.7

## POLE CLAMP SHAFT/KNOB ASSEMBLY AND POLE CLAMP SHAFT TIP REPLACEMENT

The recommended tool for this procedure is wide-head pliers.

To replace the pole clamp shaft/knob assembly and the pole clamp shaft tip, refer to *Figure 7-5, Rear Enclosure Assembly Components (115 VAC - Plum XL)*, then proceed as follows:

1. Turn the control knob to OFF/CHARGE.
2. Disconnect the infusion system from AC (mains) power.
3. Turn the pole clamp shaft/knob assembly counterclockwise to remove it from the pole clamp extrusion and loosen the pole clamp shaft tip from the pole clamp/shaft knob assembly.

   **Note:** The pole clamp shaft tip has a long shaft that is pressed into the threaded pole clamp shaft/knob assembly.

4. Turn the pole clamp shaft/knob assembly back into the pole clamp extrusion. Using wide-head pliers, grasp the pole clamp shaft tip and remove.

   **Note:** If the pole clamp shaft tip is in good condition, re-use it with the replacement pole clamp shaft/knob assembly. If the pole clamp shaft tip is defective, replace it.

5. Install the replacement pole clamp shaft/knob assembly into the pole clamp extrusion by turning the pole clamp shaft/knob assembly clockwise into the pole clamp extrusion until the threaded portion is visible.
6. Press the pole clamp shaft tip into the screw hole recess on the pole clamp shaft/knob assembly and turn the pole clamp shaft/knob assembly clockwise until the pole clamp shaft tip is secure against the pole clamp extrusion.
7. Connect the infusion system to AC (mains) power.

Replacement of the pole clamp shaft/knob assembly and the pole clamp shaft tip is a routine maintenance procedure and no verification procedure is normally required. However, if the infusion system may have been damaged during the pole clamp knob and tip insert replacement, perform the PVT in *Section 5.2*.

7.2.8.8

## BUZZER BOARD PWA REPLACEMENT

Recommended tools for this procedure are as follows: medium size flat-blade screwdriver and 1/4 inch nutdriver.

**CAUTION: Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected workstation. Store the PWA in an antistatic bag before placing it on any surface.**

To replace the buzzer board PWA, refer to *Figure 7-7, Rear Enclosure Assembly Components (115 VAC - Plum XLM)*, or *Figure 7-8, Rear Enclosure Assembly Components (220 VAC - Plum XLM)*, then proceed as follows:

1. Remove the power supply PWA as described in *Section 7.2.8.2, Power Supply PWA Replacement*.

2. Remove the EMI shield.
3. Using a flat-blade screwdriver, remove the four slotted screws securing the buzzer board PWA to the rear enclosure assembly. Remove the buzzer board PWA from the rear enclosure assembly.
4. Install the replacement buzzer board PWA in the exact reverse order of removal.

To verify successful buzzer board PWA replacement, perform the PVT in *Section 5.2.*

## 7.2.9
# MAIN CHASSIS ASSEMBLY COMPONENT REPLACEMENT

Main chassis assembly component replacement includes the replacement of the following:

- ❑ Mechanism assembly
- ❑ MCU PWA and sensor/MCU cable assembly
- ❑ Cassette door and mechanism shield
- ❑ Opener handle assembly

**Note:** The MCU PWA is not supplied with the main chassis assembly; however, the MCU PWA is located in the main chassis assembly.

## 7.2.9.1
## MECHANISM ASSEMBLY REPLACEMENT

The recommended tool for this procedure is a medium size flat-blade screwdriver.

**CAUTION: Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected workstation. Store the PWA in an antistatic bag before placing it on any surface.**

To replace the mechanism assembly, refer to *Figure 7-9, Exploded View of the Main Chassis Assembly,* then proceed as follows:

1. Separate the front enclosure assembly, rear enclosure assembly, and main chassis assembly as described in *Section 7.2.3, Separating the Front Enclosure Assembly, Rear Enclosure Assembly, and Main Chassis Assembly.*
2. Remove the MCU PWA as described in *Section 7.2.9.2, MCU PWA and Sensor/MCU Cable Assembly Replacement.* Disconnect the sensor/MCU cable assembly from the mechanism assembly at J6.
3. Using a medium size flat-blade screwdriver, remove the hex-head screw securing the mechanism assembly to the main chassis assembly. Remove the mechanism assembly from the main chassis assembly.
4. Remove the cassette door and mechanism shield as described in *Section 7.2.9.3, Cassette Door and Mechanism Shield Replacement.* Remove the opener handle as described in *Section 7.2.9.4, Opener Handle Assembly Replacement.*
5. Using the replacement mechanism, re-assemble the opener handle assembly, mechanism shield, and cassette door in the exact reverse order of removal.
6. Using a medium size flat-blade screwdriver, replace and tighten the hex-head screw securing the replacement mechanism assembly to the main chassis assembly.

7. Connect the sensor/MCU cable assembly to the replacement mechanism assembly at J6. Replace the MCU PWA in the exact reverse order of removal.
8. Join the front enclosure assembly, rear enclosure assembly, and main chassis assembly in the exact reverse order of separation.

   **Note:** (XLM with DataPort) When joining the front and rear enclosures, do not pinch the DataPort/MCU cable between the two enclosures.

9. Connect the infusion system to AC (mains) power.

   **Note:** (XLM with DataPort only) Perform the following steps to verify proper operation of the Dataport.

10. Enter the service mode as described in *Section, 6.2.3 Service Mode.*
11. Verify the value of the communication selection as described in *Section 6.2.3.4.1, Communication Selection.* Update the value if necessary.
12. Verify the value of the channel label as described in *Section 6.2.3.4.3, Channel Label.* Update the value if necessary.

To verify successful mechanism assembly replacement, perform the PVT in *Section 5.2.*

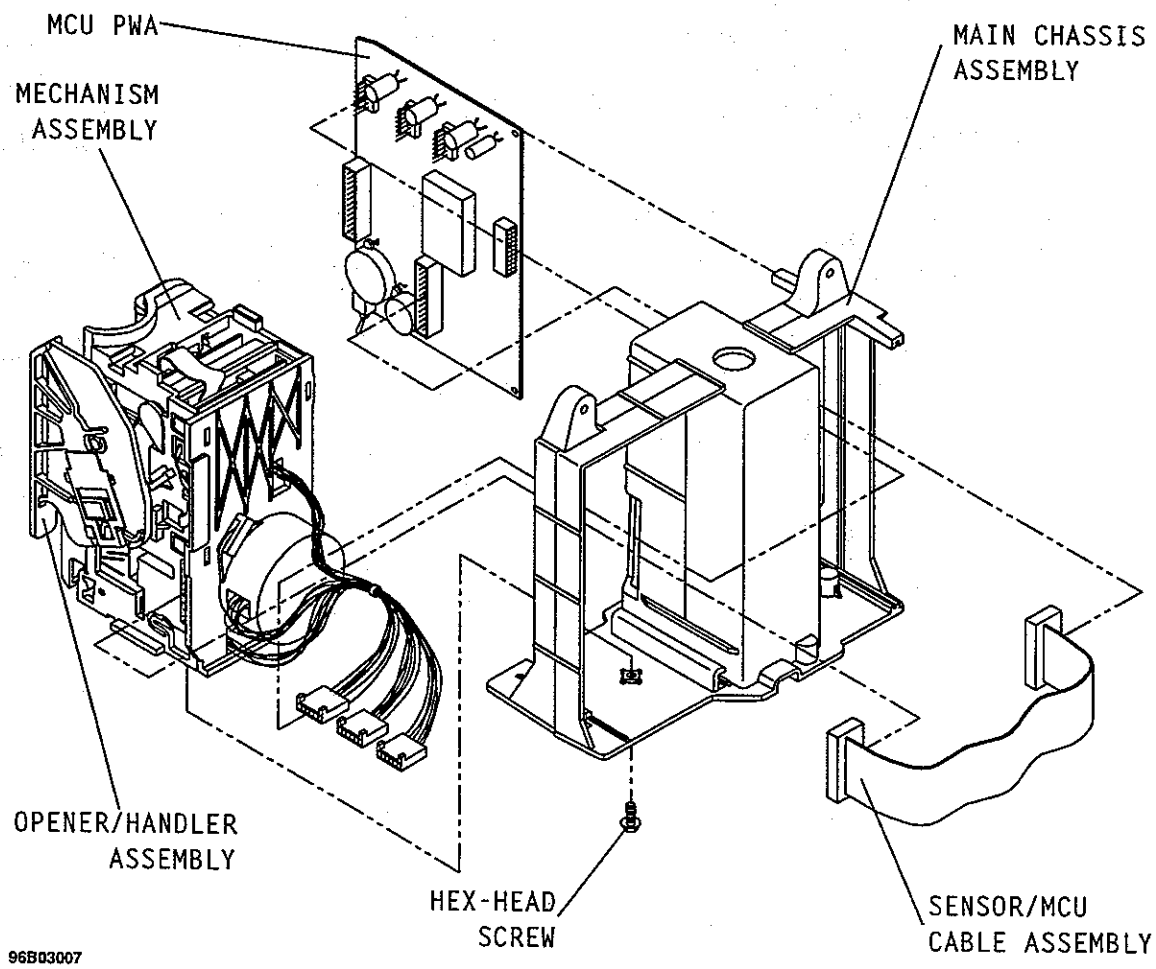


**Figure 7-9. Exploded View of the Main Chassis Assembly**

7.2.9.2

# MCU PWA AND SENSOR/MCU CABLE ASSEMBLY REPLACEMENT

The recommended tool for this procedure is a medium size flat-blade screwdriver.

**CAUTION: Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected workstation. Store the PWA in an antistatic bag before placing it on any surface.**

To replace the MCU PWA and the sensor/MCU cable assembly, refer to *Figure 7-9, Exploded View of the Main Chassis Assembly* and *Figure 7-10, Top View of the Main Chassis Assembly*, then proceed as follows:

1. Separate the front enclosure assembly, rear enclosure assembly, and main chassis assembly as described in *Section 7.2.3, Separating the Front Enclosure Assembly, Rear Enclosure Assembly, and Main Chassis Assembly.*
2. Disconnect the following cables from the MCU PWA: sensor/MCU cable assembly from J5, plunger motor cable assembly from J7, input/output motor cable assembly from J8, and primary/secondary motor cable assembly from J9. Replace the sensor/MCU cable assembly if damaged.
3. Slide the MCU PWA out of the main chassis assembly.
4. Install the replacement MCU PWA into the main chassis assembly in the exact reverse order of removal.
5. Connect the following cables to the MCU PWA: plunger motor cable assembly to J7, input/output motor cable assembly to J8, and primary/secondary motor cable assembly to J9.
6. Connect the sensor/MCU cable assembly to J5 of the MCU PWA.
7. (XLM with DataPort only) Position the ferrite between MCU J5 and the battery compartment. Verify the sensor/MCU cable is looped back to J5 in an 'S' configuration as shown in *Figure 7-10.*
8. Join the front enclosure assembly, rear enclosure assembly, and main chassis assembly in the exact reverse order of separation.

   **Note:** (XLM with DataPort) When joining the front and rear enclosures, do not pinch the DataPort/MCU cable between the two enclosures.

9. Connect the infusion system to AC (mains) power.

To verify successful MCU PWA replacement, perform the PVT in *Section 5.2.*

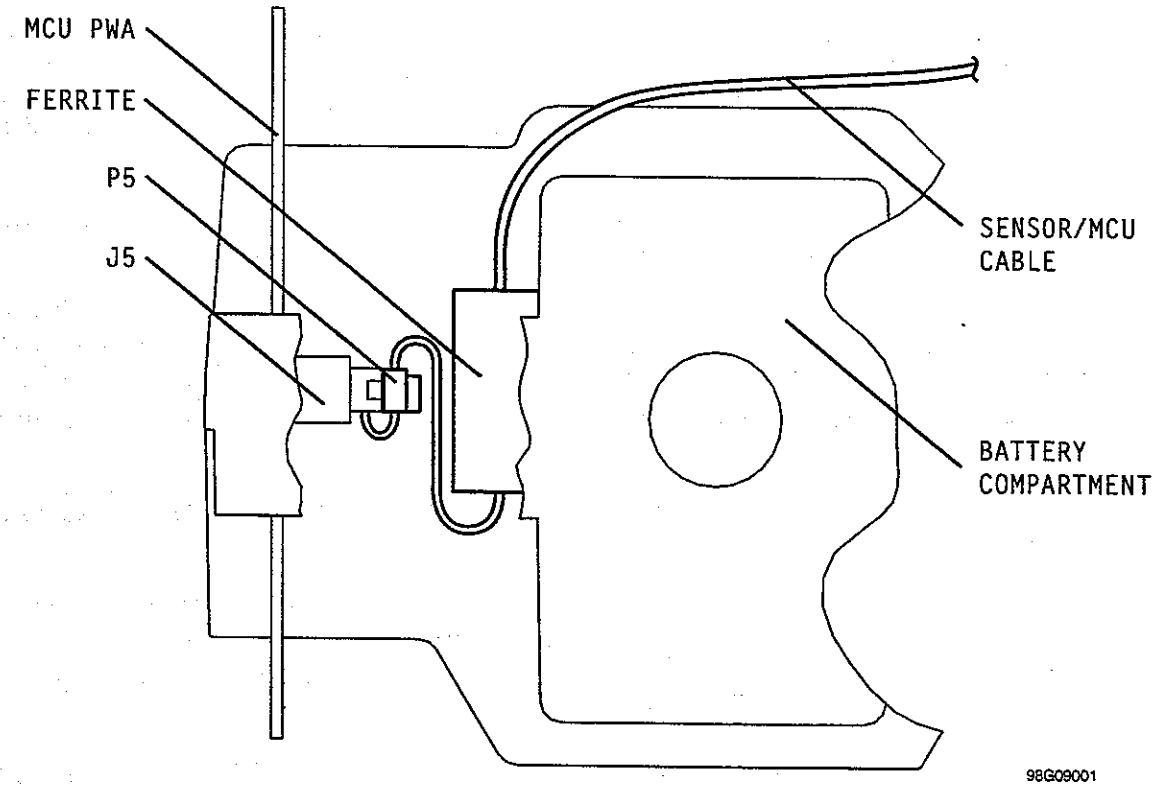


**Figure 7-10. Top View of the Main Chassis Assembly**

7.2.9.3

## CASSETTE DOOR AND MECHANISM SHIELD REPLACEMENT

Recommended tools for this procedure are as follows: medium size flat-blade screwdriver and long needle-nose pliers.

**CAUTION: Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected workstation. Store the PWA in an antistatic bag before placing it on any surface.**

To replace the cassette door and mechanism shield, refer to *Figure 7-11, Mechanism Shield Replacement*; *Figure 7-12, Cassette Door Replacement*; and *Figure 7-13, Cassette Door Replacement, Bottom View*, then proceed as follows:

1. Separate the front enclosure assembly, rear enclosure assembly, and main chassis assembly as described in *Section 7.2.3, Separating the Front Enclosure Assembly, Rear Enclosure Assembly, and Main Chassis Assembly.*
2. Remove the mechanism assembly from the main chassis assembly as described in *Section 7.2.9.1, Mechanism Assembly Replacement.*
3. Open the cassette door. Disengage and fully open the cassette door from the opener handle assembly *(see Figure 7-11).*
4. On the backside of the mechanism shield, disengage the clips that retain the upper portion of the mechanism shield to the mechanism assembly. Pull the shield away from the top of the mechanism assembly at an approximate 15-degree angle. Pull shield up and away, clearing the mechanism assembly pins and plunger.
5. Close the cassette door.
6. Position the mechanism assembly to access its bottom.

7. Grasp the cassette door pivot retainer clip sides and squeeze together to free the side flanges from the mechanism assembly *(see Figure 7-12 and Figure 7-13)*. Once flanges are free, grasp the cassette door pivot retainer clip with needle-nose pliers. Simultaneously pull out and rotate the cassette door retainer clip toward the cassette door.

   **Note:** When removing the cassette door, the left side door clip may fall free. Verify the position of the left side door clip prior to cassette door removal.

8. Fully open the cassette door. Note the position of the left-side door clip. Grasp the mechanism assembly in one hand and with the other hand, rotate and lift the cassette door free of the left-side door clip. Remove the cassette door from the hinge.
9. Install the replacement cassette door in the exact reverse order of the cassette door removal.

   **Note:** Prior to mechanism shield replacement, align the mechanism assembly pins.

10. Install the replacement mechanism shield in the exact reverse order of removal.
11. Replace the mechanism assembly in the exact reverse order of removal.
12. Join the front enclosure assembly, rear enclosure assembly, and main chassis assembly in the exact reverse order of separation.

    **Note:** (XLM with DataPort) When joining the front and rear enclosures, do not pinch the DataPort/MCU cable between the two enclosures.

13. Connect the infusion system to AC (mains) power.

To verify successful cassette door and mechanism shield replacement, perform the PVT in *Section 5.2*.

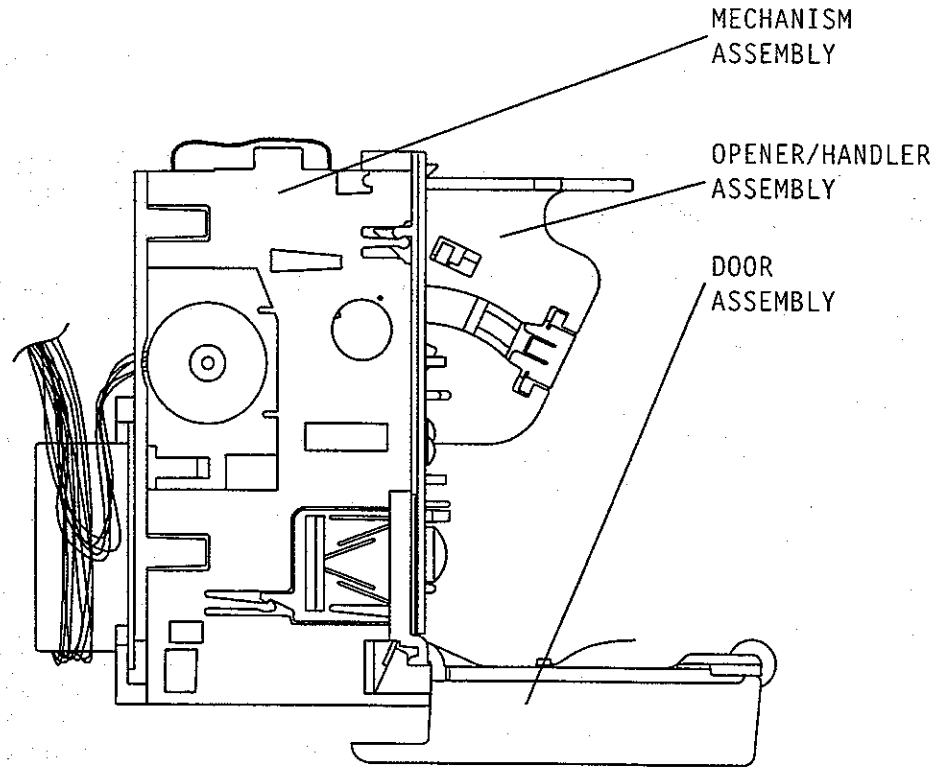


**Figure 7-11. Mechanism Shield Replacement (1 of 2)**

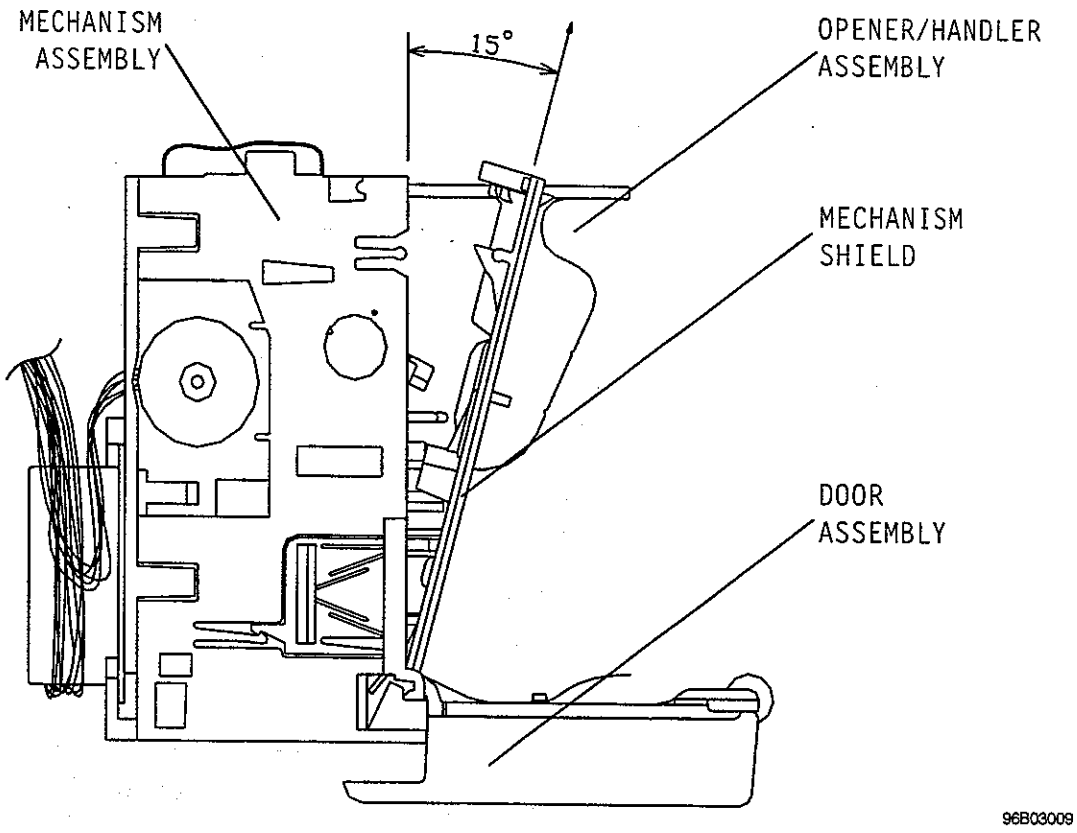


**Figure 7-11. Mechanism Shield Replacement (2 of 2)**

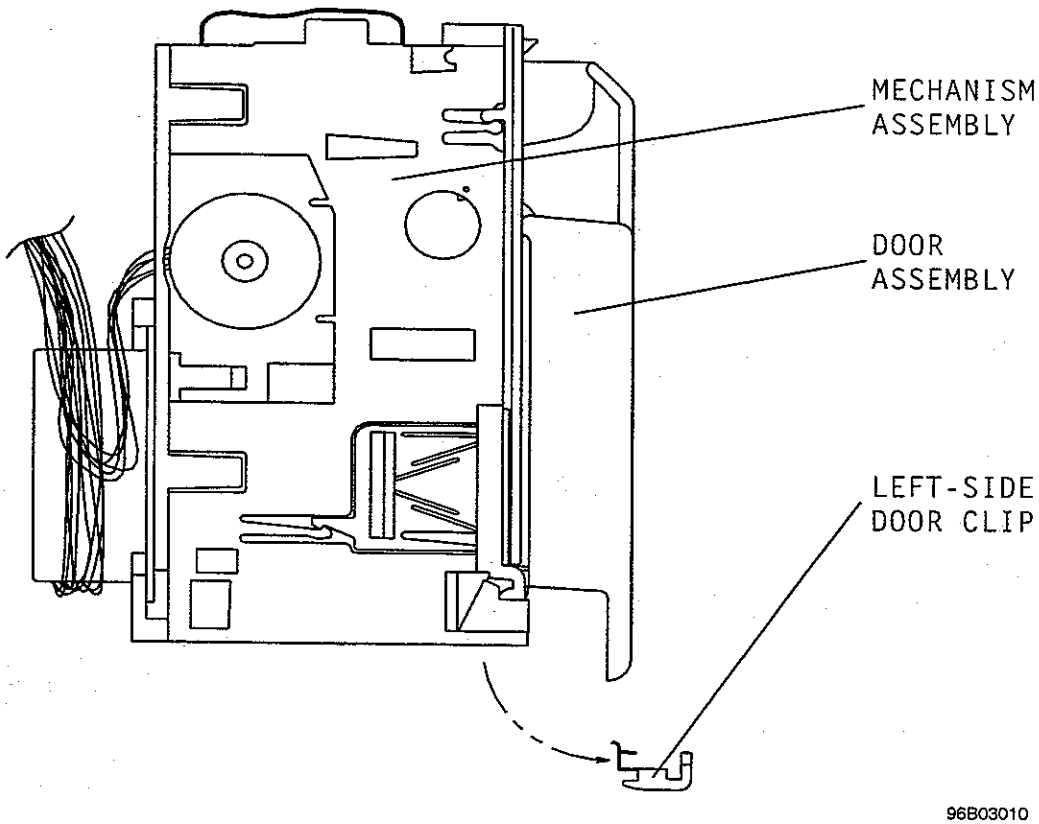


**Figure 7-12. Cassette Door Replacement (1 of 3)**

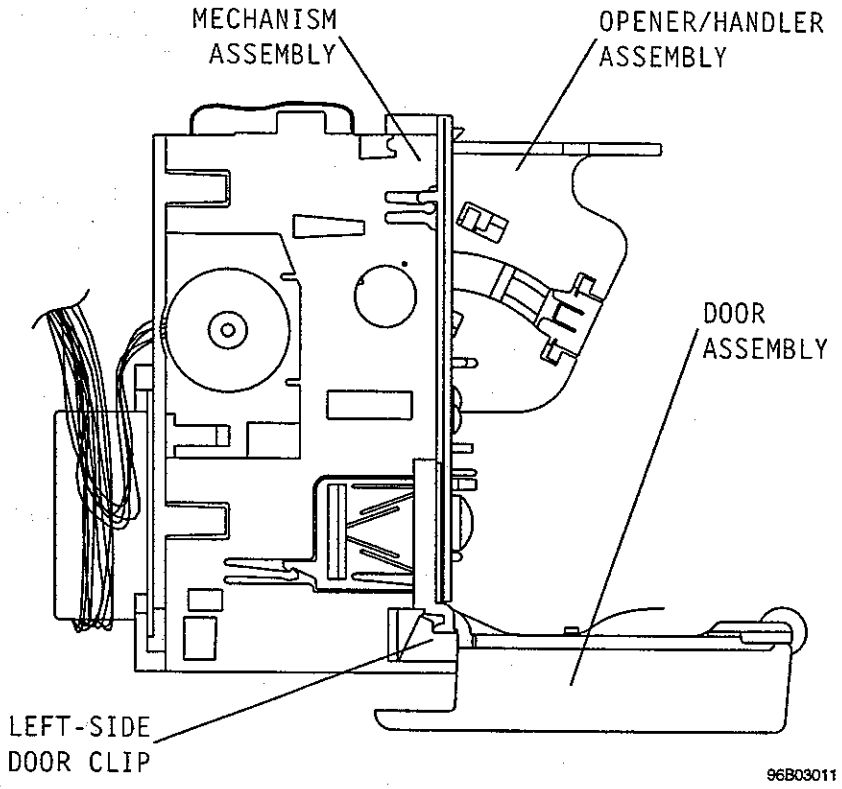


**Figure 7-12. Cassette Door Replacement (2 of 3)**

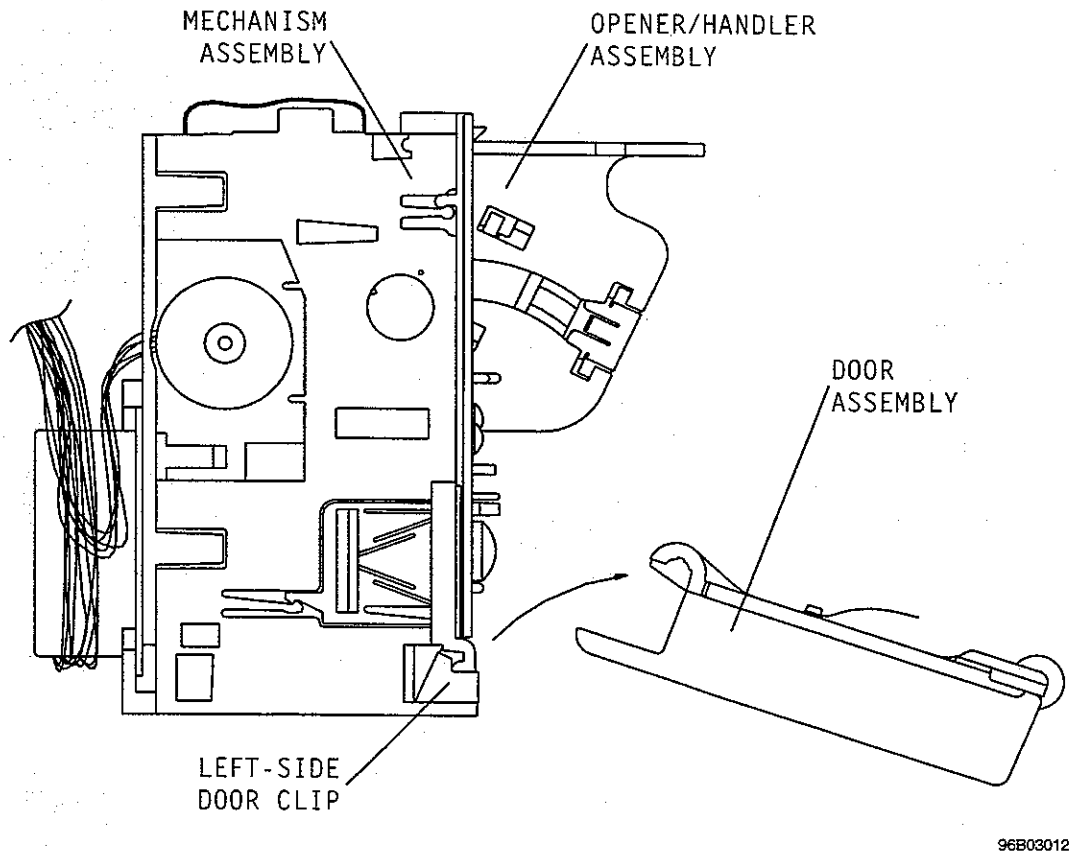


**Figure 7-12. Cassette Door Replacement (3 of 3)**

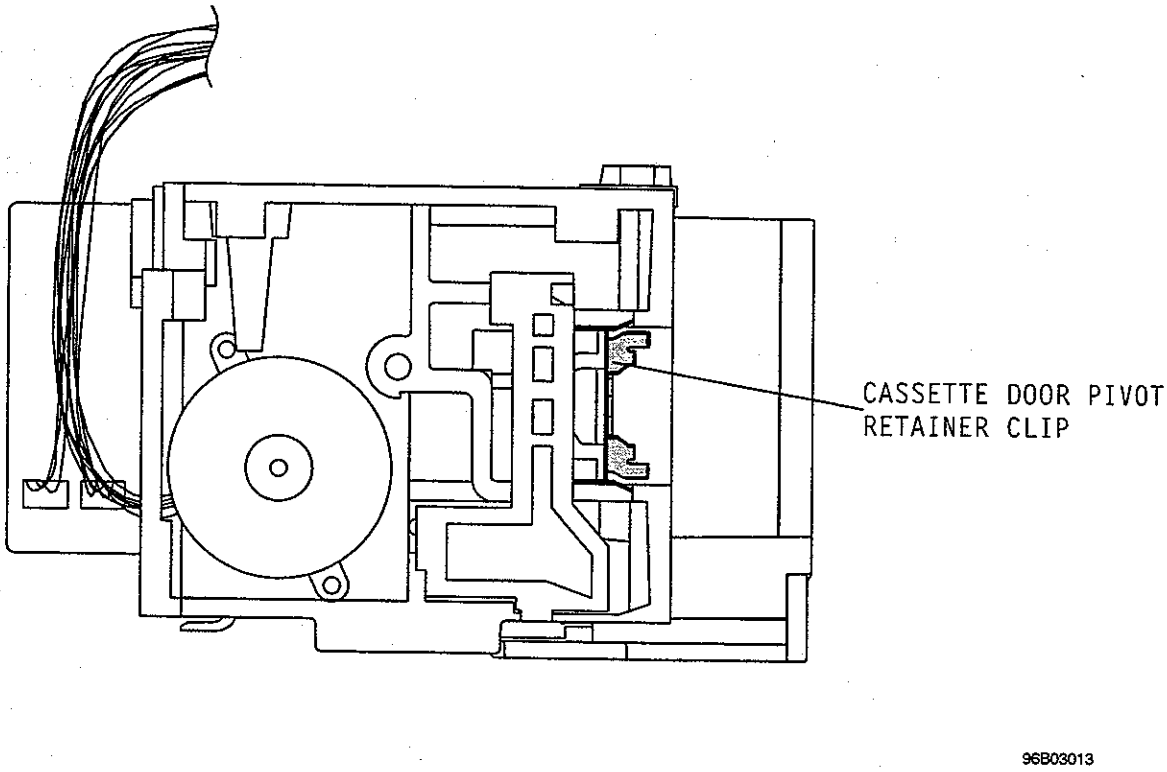


**Figure 7-13. Cassette Door Replacement, Bottom View**

7.2.9.4

## OPENER HANDLE ASSEMBLY REPLACEMENT

The recommended tool for this procedure is a medium size flat-blade screwdriver.

**CAUTION: Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected workstation. Store the PWA in an antistatic bag before placing it on any surface.**

To replace the opener handle assembly, refer to *Figure 7-14, Opener Handle Assembly Replacement*, then proceed as follows:

1. Separate the front enclosure assembly, rear enclosure assembly, and main chassis assembly as described in *Section 7.2.3, Separating the Front Enclosure Assembly, Rear Enclosure Assembly, and Main Chassis Assembly.*
2. Remove the mechanism assembly as described in *Section 7.2.9.1, Mechanism Assembly Replacement.*
3. Lift the opener handle assembly. Open and disengage the cassette door. Close the opener handle assembly.
4. Remove the retaining clip.
5. Insert the medium size flat-blade screwdriver between the opener handle assembly and the mechanism assembly. Carefully pry the assemblies apart. Remove the handle roller from the backside of the opener handle assembly as the opener handle is removed.

**Note:** The door pivot retainer and torsion spring may fall free.

6. Install the replacement opener handle assembly in the exact reverse order of removal. Confirm that the shaft alignment dots are aligned *(see Figure 7-14, 3 of 3).*
7. Replace the mechanism assembly in the exact reverse order of removal.
8. Join the front enclosure assembly, rear enclosure assembly, and main chassis assembly in the exact reverse order of separation.

   **Note:** (XLM with DataPort) When joining the front and rear enclosures, do not pinch the DataPort/MCU cable between the two enclosures.

9. Connect the infusion system to AC (mains) power.

To verify successful opener handle assembly replacement, perform the PVT in *Section 5.2.*

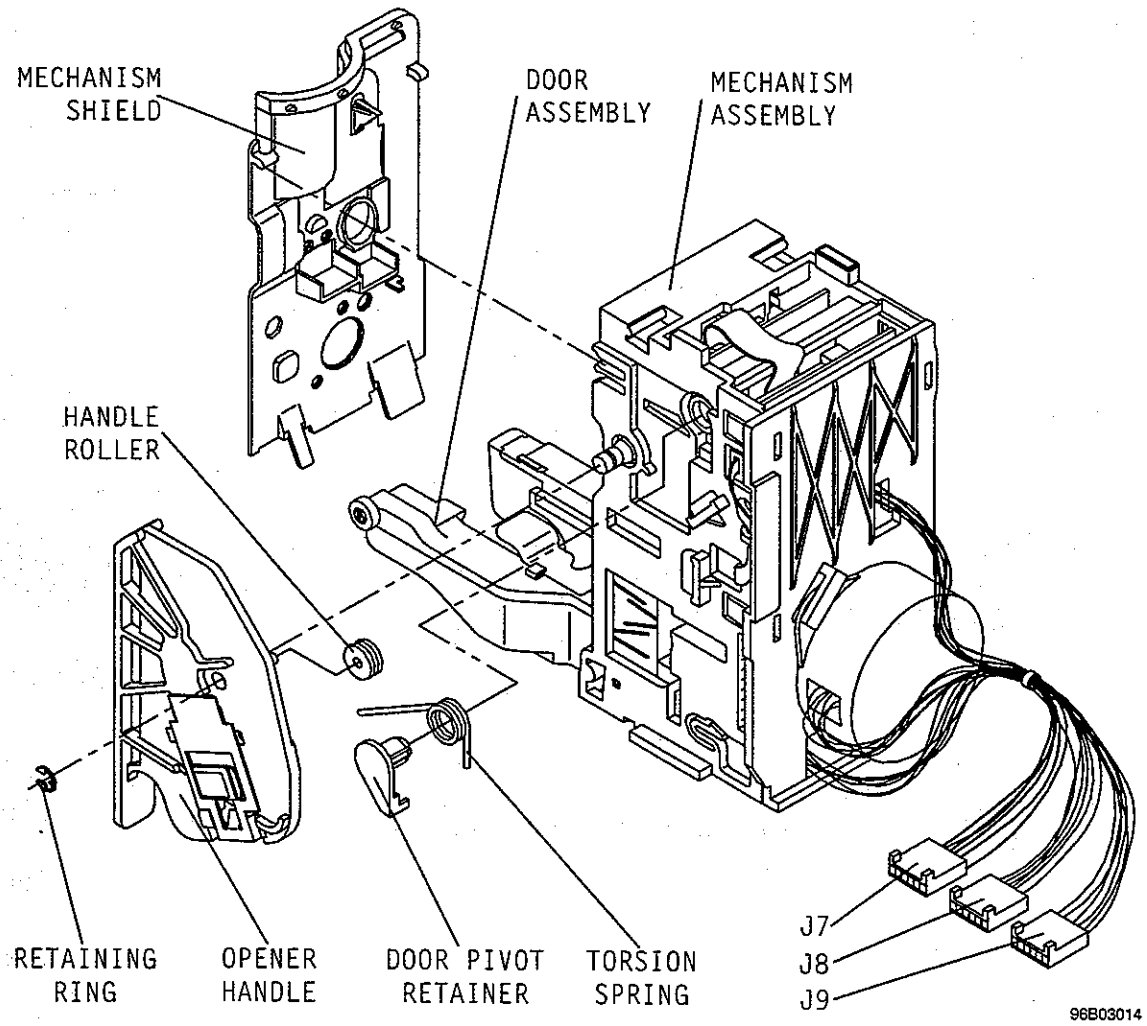


**Figure 7-14. Opener Handle Assembly Replacement (1 of 3)**

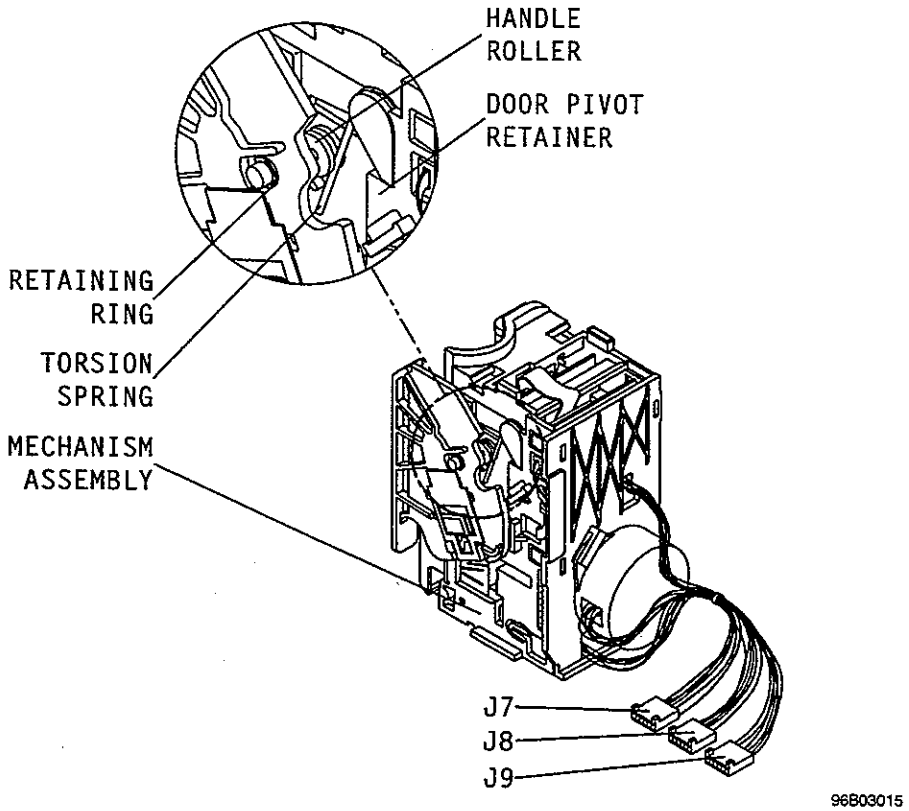


**Figure 7-14. Opener Handle Assembly Replacement (2 of 3)**

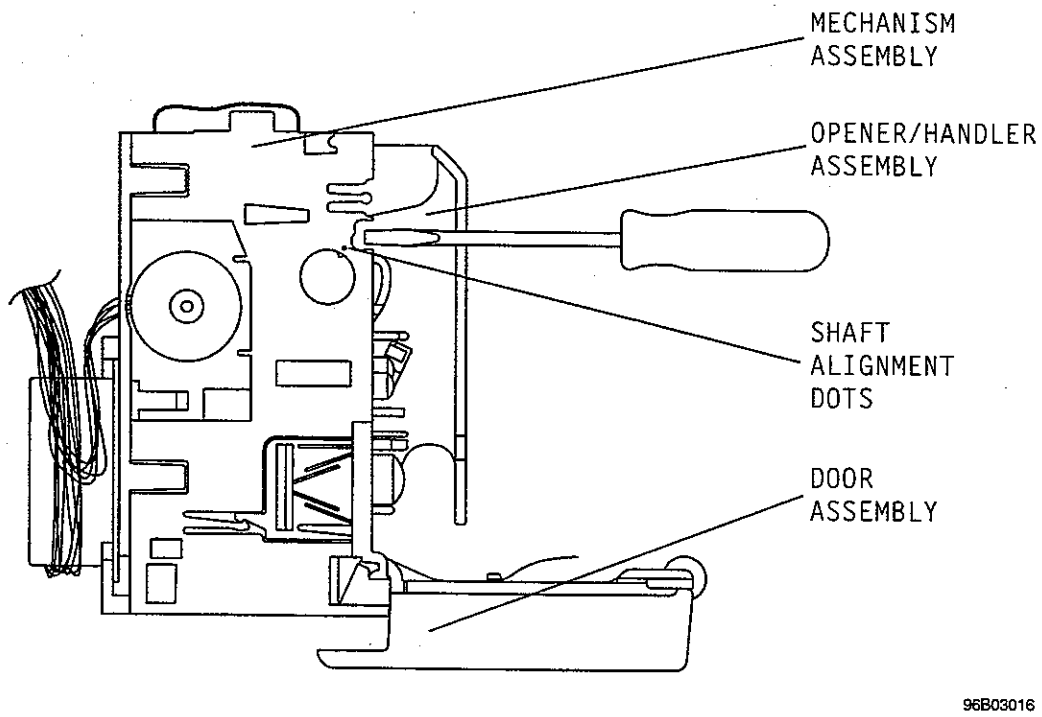


**Figure 7-14. Opener Handle Assembly Replacement (3 of 3)**

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Section 8

# SPECIFICATIONS

This section contains specifications for the 115 VAC Plum XL and 220 VAC Lifecare XL infusion systems.

## 8.1
## PLUM XL AND XLM

The following specifications apply to the Plum XL infusion system only.

**PHYSICAL**

**Dimensions:** Approximately 8.25H x 7.5W x 8.75D inches (including pole clamp)

**Weight:** Approximately 7.75 lbs (with battery)

**Casing:** High-impact plastic

**ELECTRICAL**

**Power Requirements:** 100-130 VAC, 50 to 60 Hz, less than 35 W

**Power Cord:** Hospital-grade AC (mains) cord. 10 feet long, with transparent plug

**Fuses:** 0.5 A, 250 V, slo-blo

**Battery** Sealed lead-acid, rechargeable 8 V battery, internal to infusion system. Accessible for ease of field replacement, with color-coded leads and polarized connector

**Battery Operation (XL/XLM):** A fully charged new battery provides eight hours of operation at 125 ml/hr, or 1000 ml total volume delivered, whichever occurs first

**Battery Operation (XLM with DataPort):** With DataPort circuitry disabled, a fully charged new battery provides eight hours of operation at 125 ml/hr, or 1000 ml total volume delivered, whichever occurs first. With DataPort enabled, a fully charged new battery provides approximately five hours of operation at 125 ml/hr, or 625 ml total volume delivered, whichever occurs first

**Recharge:** The battery charges whenever the infusion system is connected to AC (mains) power. If the infusion system is operating at 125 ml/hr, a full recharge takes approximately 16 hours. If the infusion system is turned to OFF/CHARGE, recharge takes approximately eight hours

**ENVIRONMENT**

**Operating Temperature:** 0° to 40° C, 10% to 90% relative humidity

**TRANSPORT AND STORAGE ENVIRONMENT**

**Temperature:** -20° to 60° C

**Relative Humidity:** 10% to 90%

**Atmospheric Pressure:** 0-10,000 feet (0-3,000m) or equivalent pressure

**DELIVERY RATE RANGE:**

**Primary, Secondary Mode**

**XL:** 1 to 999 ml/hr (in 1 ml increments)

**XLM:** 0.1 to 99.9 ml/hr (in 0.1 ml increments)
100 to 999 ml/hr (in 1 ml increments)

**KVO**

**XL:** 1 ml/hr

**XLM:** The lower of 1.0 ml/hr or the last rate delivered

**DOSE LIMIT RANGE**

**XL:** 1 to 9999 ml/hr (in 1 ml increments)

**XLM:** 0.1 to 99.9 ml (in 0.1 ml increments)
100 to 9999 ml (in 1 ml increments)

**OCCLUSION RANGE**

**Distal:** 10 psig (+5, -2 psig)

## 8.2
# LIFECARE XL AND XLM

The following specifications apply to the LifeCare XL infusion system only.

**PHYSICAL**

**Dimensions:** 21 x 19 x 22 cm

**Weight:** Approximately 3.5 kg (with battery)

**Casing:** High-impact plastic

**ELECTRICAL**

**Mains Voltage:** 210-260 VAC, 47 - 63 Hz, 35 VA, or 100-130 VAC, 47 - 63 Hz, 35 VA

**Mains Fusing:** Two each: T500 mA, 250 V, 5 x 20 mm

**Mains Cord:** IEC 601-1 approved, removable cord, 3 m in length

**Battery:** One 8 V, sealed, rechargeable battery, internal to the infusion system. Accessible for ease of field replacement, with color-coded leads and polarized connector

**Battery Operating Time (XL/XLM):** With a new, fully charged battery, the infusion system provides approximately 1000 ml delivery volume or eight hours of operation, whichever occurs first. The infusion system displays a low battery alarm approximately 30 minutes prior to infusion system shutdown when pumping at 125 ml/hr. If a low battery alarm occurs, immediately connect the infusion system to mains power

**Note:** Gradual degradation over extended periods of use decreases the operational capacity of the battery. Typical battery life is three years. A yearly check is recommended to verify performance. When capacity drops to an unacceptable level, replace the battery. Battery replacement must be performed by qualified technical personnel

**Battery Operating Time (XLM with DataPort):** With DataPort circuitry disabled, a fully charged new battery provides eight hours of operation, or 1000 ml total volume delivered, whichever occurs first. With DataPort enabled, a fully charged new battery provides approximately five hours of operation, or 625 ml total volume delivered, whichever occurs first. The infusion system displays a low battery alarm approximately 30 minutes prior to infusion system shutdown when pumping at 125 ml/hr. If a low battery alarm occurs, immediately connect the infusion system to mains power

**Note:** Gradual degradation over extended periods of use decreases the operational capacity of the battery. Typical battery life is three years. A yearly check is recommended to verify performance. When capacity drops to an unacceptable level, replace the battery. Battery replacement must be performed by qualified technical personnel

**Battery Recharge:** The battery recharges when the infusion system is connected to mains power. If the infusion system is operating at 125 ml/hr, a full recharge takes approximately 16 hours. Recharge takes approximately eight hours if the infusion system is turned to the OFF/CHARGE position

**Battery Charge Retention:** A fully charged battery retains at least 20 percent of its capacity after six months of storage at below 35° C (95° F) in an infusion system not connected to mains power

**ENVIRONMENT**

**Operating Temperature:** 0° to 40° C (50° to 104° F) 10 percent to 90 percent relative humidity

**Shipping and Storage:** -20° to 60° C (-4° to 140° F) 10 percent to 90 percent relative humidity

**DELIVERY RATE RANGE**

**Flow Rate Range**

**XL:** 1 to 999 ml/hr (in 1 ml increments)

**XLM:** 0.1 to 99.9 ml/hr (in 0.1 ml increments)
100 to 999 ml/hr (in 1 ml increments)

**KVO**

**XL:** 1 ml/hr

**XLM:** The lower of 1.0 ml/hr or the last rate delivered

**DOSE LIMIT RANGE**

**XL:** 1 to 9999 ml/hr (in 1 ml increments)

**XLM:** 0.1 to 99.9 ml (in 0.1 ml increments)
100 to 9999 ml (in 1 ml increments)

**ELECTRONIC MEMORY:** Rates, dose limits, and total volume delivered are maintained indefinitely

**ELECTRICAL SAFETY:** Designed to meet IEC 601-1-1 standards

**Class 1:** Mains supply equipment using protective earth

Equipment providing a degree of protection higher than that for Type BF equipment against electrical shock particularly regarding allowable leakage currents, and having an F-Type applied part

**Type CF**

**IPX1**

**Drip Proof** Equipment protected against dripping water

Attention! Consult accompanying documents

Terminal for connection of an equipotential conductor

**MAXIMUM OCCLUSION PRESSURE:** 99 kPa

**OCCLUSION ALARM PRESSURE LIMIT:** 69 ± 14 kPa

**MAXIMUM OVERINFUSION:** The maximum overinfusion under single fault conditions is 25 percent

**MAXIMUM STORED BOLUS VOLUME:**

**Delivery Rate:** 1 ml/hr = 0.6 ml
100 ml/hr = 0.6 ml
999 ml/hr = 0.6 ml

**MAXIMUM TIME FROM OCCLUSION TO ALARM:** Delivery Rate:
1 ml/hr = 40 minutes
100 ml/hr = 30 seconds
999 ml/hr = 2 seconds

**DELIVERY RATE ACCURACY:** ± 5 percent in typical clinical use

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